TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT

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IN

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BY

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Dedicated

to

my Family

&

Teachers

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DR. SIYARAM SHARAN KUSHWAHA

LIST OF ABBREVIATIONS

AGA –	Appropriate for gestational age
B.wt –	Birth weight
BMV –	Bag and mask ventilation
BPD –	Broncho pulmonary dysplasia
CPAP –	Continuous positive airway pressure (nasal)
DOA -	Date of admission
DOB -	Date of birth
EDD –	Estimated date of delivery
EUGR –	Extra uterine growth restriction
HC –	Head circumference
ICH –	Intra cranial hemorrhage
LMP –	Last menstrual period
LSCS –	Lower Segment Cesaerian Section
NEC –	Necrotising enterocolitis
NICU –	Neonatal intensive care unit
NVD –	Normal vaginal delivery
OFC –	Occipito frontal circumference
PGF –	Post natal growth failure
PMA --	Post menstrual age
RDS –	Respiratory distress syndrome
ROP –	Retinopathy of prematurity
SGA –	Small for gestational age
VLBW –	Very low birth weight

ABSTRACT

Introduction: Very low birth weight (VLBW) neonates demonstrate distinct pattern of growth which differ from normal birth weight neonates. In particular, since growth has a direct effect on neurological development, monitoring of growth patterns is very important for these vulnerable neonates. Predicting the growth of very low birth weight neonates is important. Very limited studies has been done in India regarding growth pattern of VLBW babies. Therefore we planned to study the growth pattern of VLBW neonates in Punjab, North India.

Aim of Study: To study the growth pattern of VLBW neonates during hospital stay.

Materials & Methods: We planned a prospective observational study in VLBW neonates (inborn and outborn both) in the Neonatal unit in DMC and hospital Ludhiana. Our aim was to follow the growth pattern of VLBW neonates during hospital stay by comparing with the Fenton's growth curves.

Results: Total 92 neonates were included in the study. There growth records, daily weight gain and weekly length and head circumference were measured during hospital stay as per criteria. The mean Z score for weight, length, and HC at birth in all subjects was calculated and compared with Fenton's references were –0.63 ± 0.95, -0.62 ± 1.09 and -0.54 ± 1.07 respectively. At the time of discharge these values decreased to -2.14 ± 1.14, -1.27 ± 0.90 and -1.25 ± 0.89 respectively. p value found to be < 0.05 for all the parameters. SGA neonates were affected more than AGA babies. 55% of study population showed evidence of growth retardation. Fall of Z score from birth to hospital stay was most for weight (-2.14) and least for HC (-1.25) which indicates the brain sparing effect of malnutrition. The daily weight gain velocity of our cohort was 16.81±7.37 g/kg/day, and for length and head circumference it was 0.76±0.35 and 0.66±0.23 per week respectively. Mean gestational age was 29.34 (2.37) weeks and among them 27.2 % were found SGA at birth. Mean birth weight, mean length, mean HC at birth were 1092.1±200.4, 36.7±2.6 and 26±2.0 respectively. The mean duration of hospital stay 33.2 days (Range 10–72 days)

Conclusion: Our VLBW neonates suffered significant EUGR during NICU stay and showed disproportionally slow growth of HC and length as per reference chart. SGA neonates suffered significant growth lag than AGA neonates. Since this was the prospective study till discharge, a longer follow up would be prudent for better insight in to the long term follow up of these VLBW neonates.

Keywords: VLBW, Growth, Fenton, EUGR

TABLE OF CONTENTS

S. NO.	TOPIC	PAGES
I	INTRODUCTION	1-3
II	AIMS AND OBJECTIVES	4
III	REVIEW OF LITERATURE	5-8
IV	MATERIALS AND METHODS	9-13
V	OBSERVATIONS AND RESULTS	14-59
VI	DISCUSSION	60-64
VII	SUMMARY AND CONCLUSIONS	65-67
VIII	BIBLIOGRAPHY	68-75
	APPENDICES – I - PROFORMA - MASTER CHART	
	APPENDICES – II - APPROVAL LETTER OF THESIS PLAN - THESIS PLAN	

LIST OF TABLES

Table No.	Title	Page No.
1.	Male to female ratio	16
2.	SGA to AGA ratio	17
3.	Table showing Mean duration of hospital stay, Birth weight, APGAR and duration of ventilation	18
4.	Mode of delivery in study group	19
5.	Extreme preterms in the study population	20
6.	Percentage of respiratory symptoms in study group	21
7.	Percentage of neonates having respiratory failure	22
8.	Neonates having sepsis during hospital stay	23
9.	Study population having perinatal asphyxia	24
10.	Neonates required Bag and mask during resuscitation	25
11.	Hypoglycemia in study group	26
12.	Neonates received phototherapy	27
13.	Neonates suffered with RDS	28
14.	Neonates received surfactant	29
15.	Apnea of prematurty in study group	30
16.	Feed intolerance and study group	31
17.	Study group contracted with NEC	32
18.	CPAP requirement in study group	33
19.	Neonates with ROP	34
20.	Neonates required ventilatory support	35
21.	Table suggestive of duration of ventilatory support	36
22.	Ionotropes required in study group	37
23.	Final outcome of study group	38
24.	Z score at admission and at discharge in study group for weight	40

25.	Z score at admission and at discharge in study group for length	41
26.	Z score at admission and at discharge in study group for HC	42
27.	Z score in SGA as compare to AGA	43
28.	Z score of HC in SGA as compare to AGA.	45
29.	Z score in SGA than AGA at discharge	47
30.	Growth velocity of neonates taken for study	49
31.	Duration of hospital stay and the growth parameters	50
32.	Positive correlation between all the three parameter as age advances	51
33.	Positive correlation between HC and length	52
34.	Centile, weight at admission and gesational age strata at admission	53
35.	Centile weight gain and gestation age at the time of shifting	55
36.	Gestational strata, centile and length at admission	56
37.	Length, gestational age and centile at shifting	57
38.	HC, centile and gestational age at time of admission	58
39.	HC, centile and gestational age at the time of shifting	59

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	Weighing scale used and neonate lying for measurement	10
2.	Infantometer knees are gently straightened while the head and feet are aligned	11
3.	Measuring HC by using not stretchable measuring tape	12
4.	Flow chart for study group to be enrolled	12
5.	Enrollment of neonates taken up for study	14
6.	Male to female ratio	16
7.	SGA to AGA ratio	17
8.	Mode of delivery in study group	19
9.	Extreme preterms in the study population	20
10.	Percentage of neontes having respiratory symptom	21
11.	Percentage of neonates having respiratory failure	22
12.	Neonates having sepsis during hospital stay	23
13.	Study population having perinatal asphyxia	24
14.	Neonates required Bag and mask during resuscitation	25
15.	Hypoglycemia in study group	26
16.	Neonates received phototherapy	27
17.	Neonates suffered with RDS	28
18.	Neonates received surfactant	29
19.	Apnea of prematurty in study group	30
20.	Feed intolerance and study group	31
21.	Study group contracted with NEC	32
22.	CPAP requirement in study group	33
23.	Neonates with ROP	34
24.	Neonates required ventilatory support	35
25.	Ionotropes required in study group	37
26.	Final outcome of study group	38

27.	Z score at admission and at discharge in study group for weight	40
28.	Z score at admission and at discharge in study group for length	41
29.	Z score at admission and at discharge in study group for HC	42
30.	Z score in SGA as comparison to AGA	43
31.	Weight difference at admission and at discharge in both SGA and AGA.	44
32.	Z score of HC in SGA as compare to AGA	45
33.	Difference of HC at admission and at discharge in both SGA and AGA	46
34.	Z score in SGA than AGA at discharge	47
35.	Difference of length measurement SGA and AGA	48
36.	Scatter diagram showing duration of hospital stay and the growth parameters	50
37	Positive correlation between all the three parameter as age advances	51
38	Positive correlation between HC and length	52
39	Centile, weight at admission and gestational age strata at admission	54
40	Centile weight gain and gestation age at the time of shifting	55
41	Gestational strata, centile and length at admission	56
42	Length, gestational age and centile at shifting	57
43	HC, centile and gestational age at time of admission	58
44	HC, centile and gestational age at the time of shifting	59

INTRODUCTION

The WHO defines Very low birth weight neonates (VLBW) as birth weight less than 1500 gms at birth irrespective of gestational age.[1]

In India VLBW neonates constitutes 4% to 7% of the live birth and approximately 30% of neonatal death.[2]

These VLBW neonates in intrauterine environment get limited supply of nutrients, protection from hypothermia and microbial invasion, and once they are delivered , there is more risk of sepsis and intermittent supply of nutrients and then they are prone to overall lag in growth in terms of weight, length and head circumference a term called Extrauterine growth restriction.[3,4]

The post natal growth of these neonates should mimic the intrauterine growth rates to enable organ development, but the optimal growth pattern of these VLBW neonates is not known.[5]

Despite improvement in care of VLBW neonates, they continue to suffer growth lag during neonatal period and early infancy and most of them experience catch up growth much later after 2 year of age.[6]

VLBW neonates are more vulnerable to extra uterine growth restriction(EUGR).[7]

Impaired fetal and post natal growth is associated with neurodevelopmental delay, ischemic heart disease, impaired glucose tolerance, type 2 diabetes mellitus hypertension and metabolic syndrome.[8,9]

Morbidities such as presence of respiratory distress syndrome (RDS), Bronchopulmonary dysplasia (BPD), sepsis and factors such as weight, gestational age and length of hospital stay have been associated with post discharge growth and development in these neonates.[10]

On the basis of postnatal growth of VLBW neonates we can predict the outcome for both as the impact of concurrent morbidities as well as neurodevelopment.[11-16]

The accurate measurement of post natal growth measurement of these VLBW neonates is essential because this provides an indirect measure

of overall health and nutritional adequacy and the consequences of poor growth in NICU might affect the long term outcome.[17]

Post natal growth retardation appears inevitable in VLBW neonates. This may be due to inability to establish adequate dietary intake in the sick unstable neonates. However this may also be due to error in feeding policy in these high risk neonates.[18]

Study done by Tanis R Fenton, and Jae H. Kim, they revised the 2003 Fenton preterm growth chart and it was balanced with the World Health Organisation growth standard and an improved transition of preterm infant growth monitoring to the WHO charts. The growth chart was likely applicable to preterm infants in both developed and developing countries.[19]

Study done by Richard A. Ehrenkranz et. al. to develop postnatal growth curves suitable for clinical and research use were constructed for body weight, length and head circumference.[20]

The accurate measurement of postnatal growth is essential to clinical care and research for VLBW infants because growth provides an indirect measure of overall health and nutritional adequacy, and the consequences of poor growth in the NICU may affect these neonates for years to come.

So, there is need for studies on VLBW neonates to evaluate postnatal growth of this specific population and such studies could provide data for producing not only ‘‘distance’’ growth charts, but also ‘‘velocity’’ charts, which would allow earlier detection of unsatisfactory growth with respect to VLBW infant peers.[20]

Post natal growth failure may be largely preventable by targeting high risk neonates with high calorific and high protein intake in the immediate post natal period. So, it is important to determine which VLBW neonates are at highest risk of post natal growth failure.[21]

If we want to implement any standardised protocol to VLBW neonates it’s very difficult due to specific requirement of each neonates due to which growth management remains a challenge among these VLBW population.[22]

Factors that predict neonatal growth velocity need to be understood in order to improve management and outcomes among VLBW neonates at risk of developing EUGR.

Growth impairment during early neonatal period have permanent detrimental effects.[23]

To reduce the neonatal morbidity imposes a great challenge in the care of the VLBW neonates.[24]

VLBW neonates show poor linear growth during hospital stay, so they need a long term follow up because this leads to persistent stunting later.[25]

Most of the studies done regarding growth of intrauterine and extrauterine life and these are mostly cross sectional studies and based on linear growth.[26-30]

We conducted this study to follow the growth patterns of VLBW neonates during NICU stay, and to analyze the difference, if any, between those born appropriate or small for gestational age (AGA or SGA).

AIMS AND OBJECTIVES

- Primary aim: To study the growth pattern (weight, length and head circumference) of very low birth weight neonates during hospital stay.
- Secondary aim: To compare the growth pattern of VLBW neonates on the basis of SGA and AGA.

REVIEW OF LITERATURE

Postnatal growth of Very Low Birth Weight (VLBW) infants (birth weight <1500g) remains a subject of concern for neonatologists. Infants born VLBW are at increased risk for impaired growth, due to certain factors during intrauterine life, exposure to hostile ex-utero environment and poorly understood nutritional needs. Despite improvement in care of VLBW infants, they continue to suffer growth lag during neonatal period and early infancy. Most of these infants experience catch up growth much later, by 8-20 years. Poor postnatal growth has been associated with subnormal long-term physical growth and neurodevelopment outcomes.

Infants born VLBW are at increased risk of impaired growth based on gender, gestational age and major morbidities.[31]

Information regarding weight gain and weight loss during NICU stay is important to understand the clinical status VLBW neonates.[32]

Most of the VLBW neonates suffered significant growth lag during hospital stay[33] and it is also seen that EUGR in these neonates is almost a universal phenomenon[34] and this causes the poor neurodevelopmental outcome.[35,36]

Coexisting morbidities affect nutritional and metabolic status[37,38] and this further affect postnatal growth and long term growth outcomes.[39]

Adequate nutrition is essential for neonates proper growth[40,41]and "Aggressive" nutrition has been tried to achieve faster growth rate[42] but despite improving the neonatal nutrition they continue to suffer growth restriction[43]

Study done by Saluja, et al. as Growth of Very Low Birth Weight Indian Infants during Hospital Stay, revealed that VLBW infants suffered significant growth lag during NICU stay.[44]

Study done by Rathore Ashutosh S, et al. described that, there is a need of large multi centric prospective cohort study to explore the growth trends of VLBW babies in India to develop Post natal growth nomograms and their Long term growth monitoring as they are at risk of growth failure.[45]

Study done by Soon Min Lee et. al. shown that PGF(Post natal growth failure) is negatively correlated with gestation and birth weight and also with a higher incidence of co-morbidities.[46]

Study done by Tanis R Fenton, et al, suggest that Weight gain trajectories of preterm infants differ from fetal- infant estimates.[19]

Study done by M A A Mamun et al. concludes that VLBW neonates had decrease in all anthropometric parameters(weight, length, HC) at 4 weeks of life, but almost maintained a near normal head growth.[47]

Study done by S Klevebro et al. In their cohort study found that the postnatal growth pattern was associated with morbidities such as ROP, BPD and NEC as well as with gestational age at birth.[48]

Study done by Ehrenkranz RA et al. have found that once birth weight was regained, weight gain (14.4-16.1 g/kg/d) approximated intrauterine rates.. Appropriate-for-gestational age without developing morbidities gained weight faster than comparable infants with morbidities. More rapid weight gain was also associated with a shorter duration of parenteral nutrition, an earlier age at the initiation of enteral feedings and achievement of full enteral feedings.[20]

Study done by Lemons JA et. Al. found that survival of neonates was depend on extend of morbidities and smaller the birth weight, more will be morbidities and more adverse effect on post natal growth.[49]

Study done by Fanaroff AA et al, to document the mortality and morbidity of VLBW neonates found no significant increases in survival in neonates without morbidities. Survival can be improved by applying best practices using therapies available, and also identifying new strategies and interventions.[50]

Study done by Tina Gutbrod et al have come to conclusion that SGA babies suffered with poorer growth than AGA neonates and SGA neonates were more prone for early developmental delay.[51]

Study done by Brandt I, Sticker EJ, Lentze MJ. suggest that early postnatal high-energy nutrient intake for SGA preterm infants is needed to promote HC catch-up growth and to prevent negative consequences of undernutrition.[52]

Study done by De Curtis M, Rigo J. concludes that VLBW infants SGA are at high risk of later growth failure and long-term consequences. They gave preference to early nutrition to reduce the incidence of growth restriction at the time of discharge.[53]

Study done by Wu YJ, Yu JL, Gu R, observed that sufficient supply of calorie and protein is needed in VLBW neonates, especially in SGA and to feed VLBW as early as possible, to improve feeding tolerance and gastrointestinal maturation.[54]

Study conducted by Were FN, Bwibo NO., observed the benefits of routine fortification of mother's milk, addition of preterm formula to improve early growth.[55]

Study done by Loui A et al reached to a conclusion that In VLBW, fetal growth are depend on feeding practices. Inadequate nutrition and disease condition contribute to postnatal growth failure.[56]

Study conducted by A. Gibson, S. Carney, J.K.H. Wales noted the growth restriction of VLBW neonates and its difficult prevention and its long term effect on post natal growth.[57]

Study done by R J Cooke, S B Ainsworth, A C Fenton found the universal nature of PGR (post natal growth retardation) in VLBW neonates and need of nutritional support of these neonates before and after hospital discharge.[58]

Study done by N E Embleton , N Pang, R J Cooke Found the significant nutrient deficit in the first few weeks of life in VLBW neonates and subsequent postnatal growth retardation[59]

Study done by Richard Cooke, MD, shows that its difficult to establish adequate dietary intake in sick, unstable neonates, so there is a need to review the ongoing recommendations and the basis of feeding requirements so that we can prevent suboptimal growth potential in this nutritionally vulnerable group of neonates.[60]

Study done by Reese H. Clark et al. regarding EUGR, its magnitude, how to prevent it and how to introduce early feed in VLBW babies and to fortify it, to improve the current practice of feeding and credible evidence that small safe changes in current practice can have a positive influence on growth.[61]

Study done by NW Gidi et al. found the high incidence of EUGR observed due to insufficient nutritional support. The risk of developing EUGR was higher in preterm infants who were VLBW, SGA and hospitalized for over 21 days.[62]

Study done by S.H. Elbeely and M.A. Al Qurashi over the period of 5 years (i.e. 2009–2013). They found that In-utero fetus doesn't encounter an interrupted nutritional supply, depletion of nutritional supplies, or increased energy consumption as seen ex-utero. The major concern was that in spite of all the efforts to match ex utero "fetal' growth to in-utero growth rate, EUGR continues to occur in the majority of extremely born preterm infants.[63]

MATERIALS AND METHODS

The study was designed as prospective observational study on VLBW neonates during the hospital stay in the Division of Neonatology, Department of Pediatrics, Dayanand medical college and hospital, Ludhiana. The study was approved by Institutional Ethics Committee. An informed consent was taken before enrollment from the parents.

SOURCE OF DATA

Very Low birth weight neonates admitted either as inborn or outborn in neonatal intensive care unit.

METHOD OF COLLECTION OF DATA

INCLUSION CRITERIA

1) VLBW neonates (<1500 gms) irrespective of the gestational age admitted at neonatal intensive care unit.

2. Both inborn and outborn neonates to be included in the study.

EXCLUSION CRITERIA

1. Major congenital malformations
2. Hospital stay <10 days
3. Admitted after 24 hours of birth.

METHOD OF COLLECTION OF DATA

Guardian/ Parents of patient fulfilling inclusion and exclusion criteria were enrolled in the study. They were informed about the purpose and nature of study, risk and benefits associated with participation in the study.

Gestational age was assessed by both maternal last menstrual period and by first trimester ultrasound scan and postnatally by New Ballard Score.[64]

ANTHROPOMETRIC MEASUREMENT AND DATA COLLECTION:

- Daily weight monitoring was done of very low birth weight neonates by electronic weighing machine till the time they were admitted. The weighing scale was calibrated weekly by standard scale accurate to 5 g.
    - The electronic weighing machine which we have used in our study is shown in figure below and the weight of neonate

was measured after zeroing the machine. The electronic weighing machine was calibrated to zero every 14 days. The name of the electronic weighing machine was Gold tech digital baby weighing scale manufactured by Precision Electronic Instrument Company, Delhi-41, India.

Figure 1: Weighing scale used and neonate lying for measurement.

- Length was measured initially within 24 hour by infantometer with an accuracy of 0.1 cm then weekly thereafter.

- The infantometer which was used in our study is shown below in figure and the method to measure the length is also shown in picture:

Figure 2: Infantometer knees are gently straightened while the head and feet are aligned.

- Head circumference (HC) or occipitofrontal circumference was measured using non stretchable measuring tape with accuracy of 0.1 cm after 24 hours and once weekly.
  - The figure below depicts how we measured HC by using non stretchable measuring tape :

Figure 3:- Measuring HC by using not stretchable measuring tape.

Z- scores for each anthropometric parameter were computed using fenton's reference.[19]

Infants below 10th centile were categorized as small for gestational age.

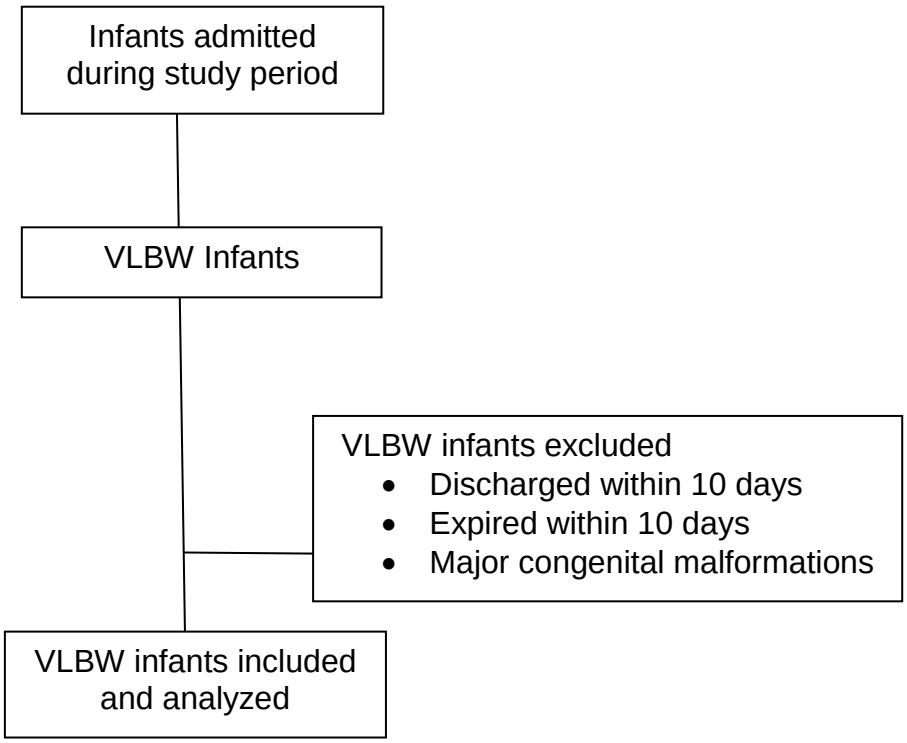

Figure 4: Flow chart for study group to be enrolled

- **Feeding protocol:**

VLBW neonates were started on either feed or fluid based on clinical status.

Infants were shifted to pediatric ward nursery when they were clinically stable, on spoon feeds, euthermic at room temperature, gaining weight at 15-20 g per day for 3 consecutive days and mother was confident of caring the baby.

DURATION OF STUDY: from 1 January 2019 to 30 may 2021.

OUTCOME:

We monitored daily weight gain along with weekly length and weekly head circumference.

STATISTICAL ANALYSIS:

Data was described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

OBSERVATION AND RESULTS

It was a prospective observational study till the time the neonates are admitted in the level III neonatal intensive care unit of a tertiary care multi-specialty teaching hospital from 1 January 2020 to 30 May 2021.

During the study period 1120 neonates were admitted, of these total 92 cases were included in the study. Out of these 92 neonates, 9 neonates died and 3 went DAMA, but they were also included in study as their duration of stay in hospital was more than 10 days.

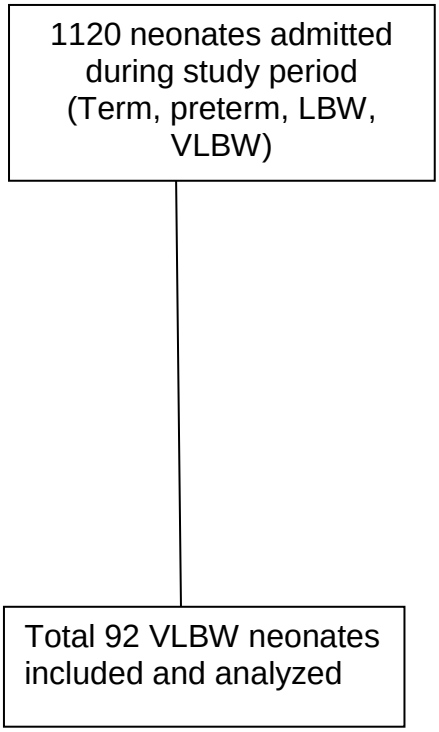

Figure 5: Enrollment of neonates taken up for study

Characteristics of the study population including neonatal morbidities are depicted below:

Characteristics of VLBW neonates

Neonatal variables (n= 92)	
Weight at admission, mean (SD)	1092 (200.4)
Gestation at admission, mean (SD)	29.34 (2.37)
Weight at discharge, mean (SD)	1467 (152)
Gestation at discharge, mean (SD)	34.03 (2.17)
Male sex, n (%)	54 (58.7)
SGA, n (%)	25 (27.2)
Mode of delivery- LSCS, n (%)	76 (82.6)
Mode of delivery- VD, n (%)	16 (17.4)
Respiratory symptom, n (%)	60 (65)
Need of surfactant, n (%)	40 (43.4)
Respiratory failures, n (%)	58 (63)
Sepsis, n (%)	42 (45.7)
PNA, n (%)	35 (38)
Hyper bilirubinemia, n (%)	40 (43.4)
Need of ventilation, n (%)	37 (40.2)
Ionotropes, n (%)	31 (33.7)
CPAP, n (%)	79 (85.6)
NEC, n (%)	28 (30.4)
Hospital stay, mean (range)	33.2 (10-72)

Here is the detailed description of neonates included in study

- Gender distribution of patients

Table 1: Male to female ratio

In our study, out of total 92 patients, 38 were female (41.3%) and remaining 54 (58.7%) were males with male to female ratio of 1.4:1.

Gender	No. of cases	Percentage
female	38	41.3%
male	54	58.7%
Total	92	100.0%

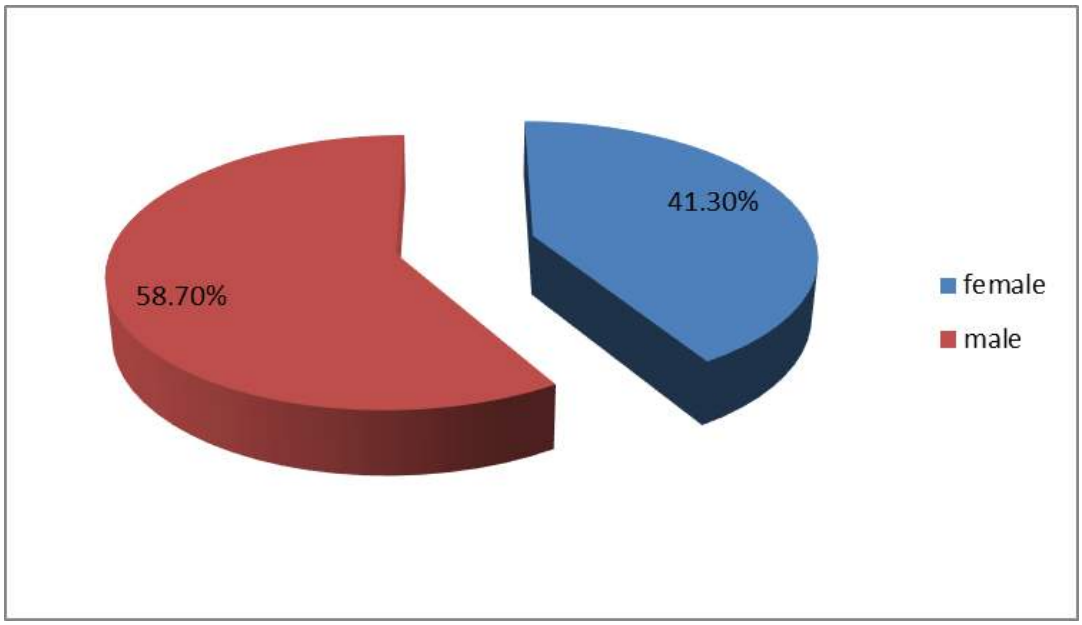

Figure 6: Male to female ratio

Table 2: SGA to AGA ratio

Out of 92 neonates, 25 (27.2%) were SGA and 67 (72.8%) were AGA.

Growth (AGA/SGA/LGA)	No. of cases	Percentage
AGA	67	72.8%
SGA	25	27.2%
Total	92	100.0%

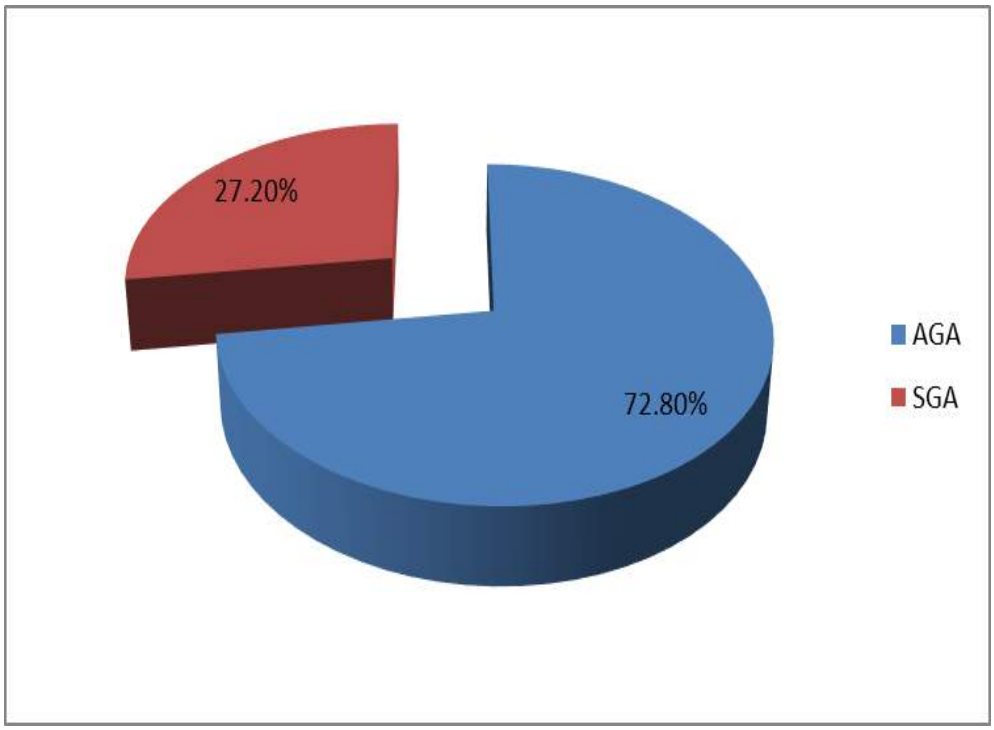

Figure 7: SGA to AGA ratio

Table 3: Table showing Mean duration of hospital stay, Birth weight, APGAR and duration of ventilation

Chart below suggest the mean duration of hospital stay, mean birth weight mean APGAR score and mean duration of ventilator support which was given to neonates

	N	Minimum	Maximum	Mean	SD
Duration of hospital stay	92	9	72	33.2	13.6
Birth Weight	92	560	1470	1092.1	200.4
APGAR 1 MIN	90	1	9	6.4	1.4
APGAR 5 MIN	90	4	10	8.3	0.9
Duration of Ventilator	60	1	15	5.2	3.5

Table 4: Mode of delivery in study group

Mode of delivery was as follows; out of 92 neonates 76 were born by Cesarean delivery and 16 were born by vaginal delivery

Mode of Delivery (VD/VD Assisted/LSCS)	No. of cases	Percentage
LSCS	76	82.6%
VD	16	17.4%
Total	92	100.0%

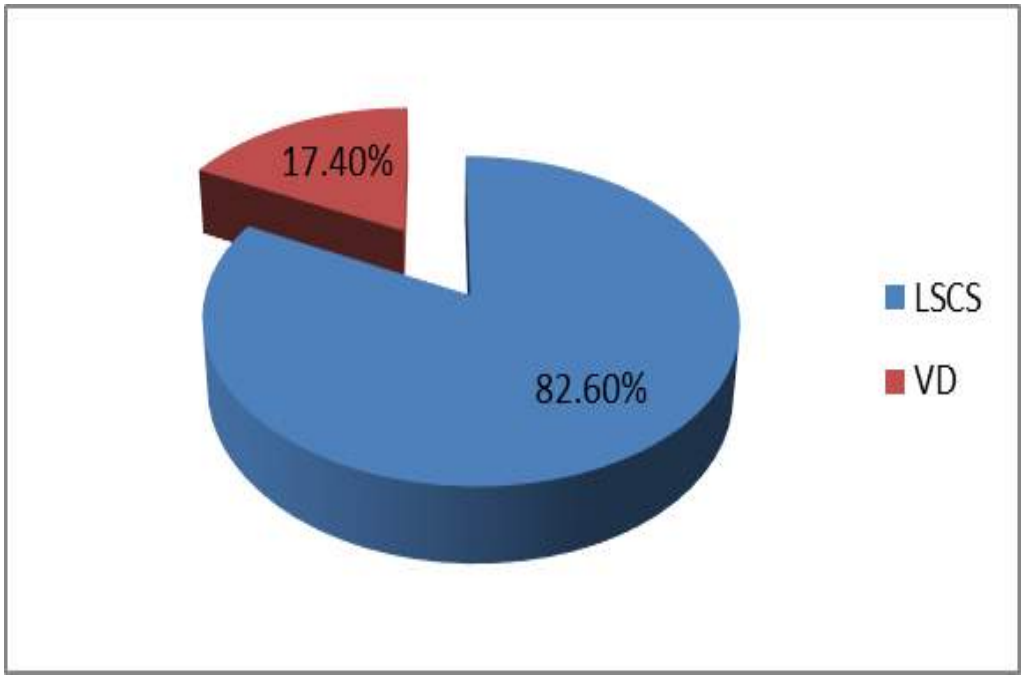

Figure 8: Mode of delivery in study group

Table 5: Extreme preterms in the study population

Here we can see the main reason of admission of these neonates are prematurity and extreme prematurity

Reason For admission Prematurity	No. of cases	Percentage
extreme preterm	15	16.3%
YES	90	97.8%
Total	92	100.0%

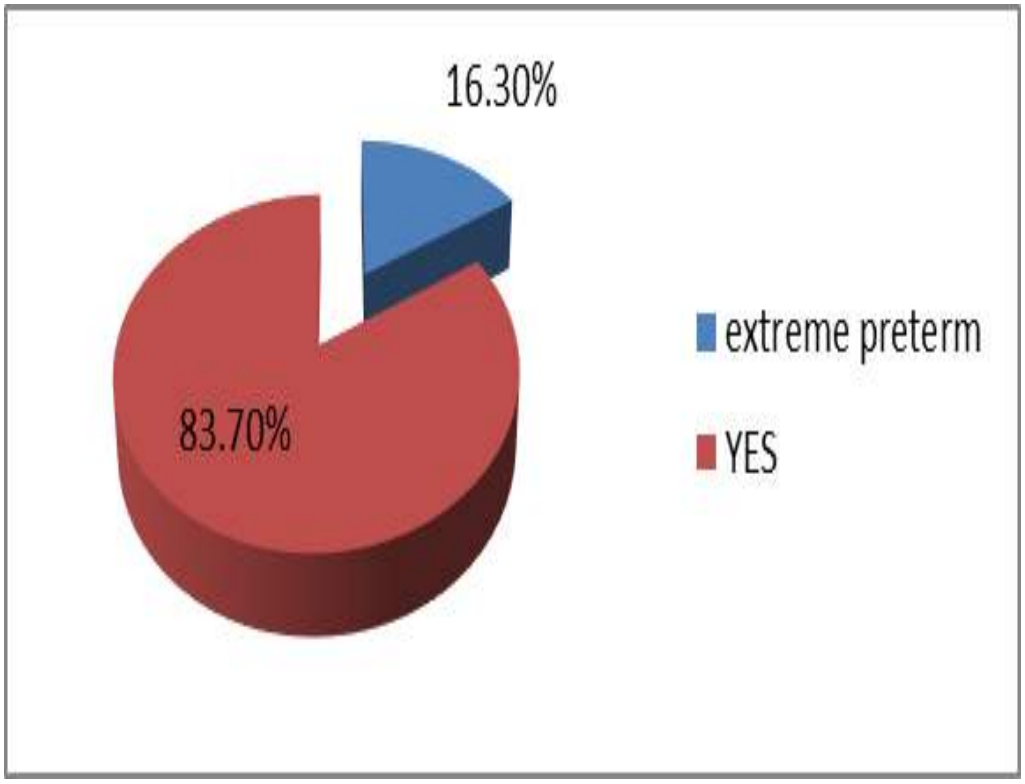

Figure 9: Extreme preterms in the study population

Table 6: Percentage of respiratory symptoms in study group

The neonates who were admitted to NICU had mainly respiratory symptom along with prematurity.

Respiratory symptoms	No. of cases	Percentage
YES	60	65.2%
NO	32	34.8%

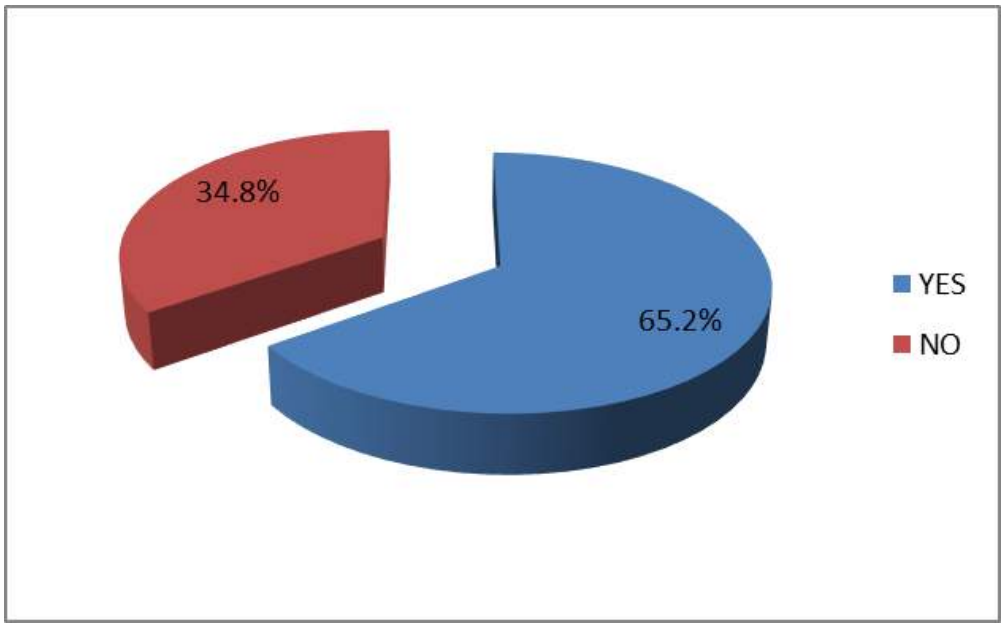

Figure 10: Percentage of neontes having respiratory symptom

Table 7: Percentage of neonates having respiratory failure

Term respiratory failure denotes the need of ventilatory support for those babies.

Respiratory Failure	No. of cases	Percentage
NO	34	37.0%
YES	58	63.0%
Total	92	100.0%

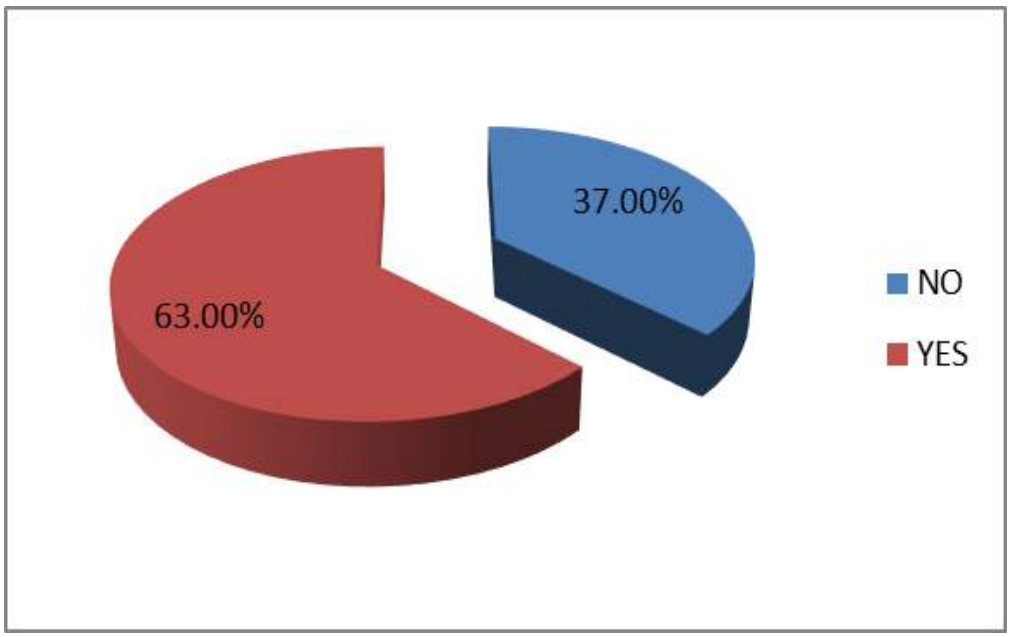

Figure 11: Percentage of neonates having respiratory failure

Table 8: Neonates having sepsis during hospital stay

Other morbidities of these study group was sepsis. Out of 92 neonates, 42 were positive for sepsis. In these neonates septic markers were positive, like c- reactive protein or procalcitonin.

Sepsis	No. of cases	Percentage
NO	50	54.3%
YES	42	45.7%
Total	92	100.0%

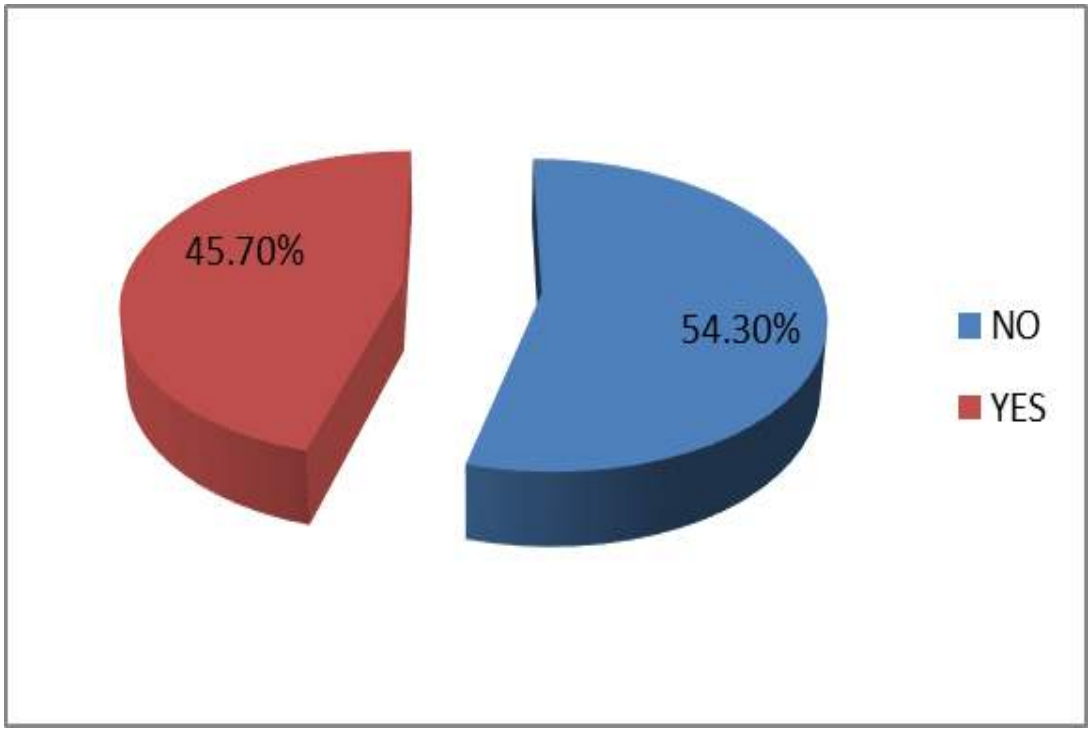

Figure 12: Neonates having sepsis during hospital stay

Table 9: Study population having perinatal asphyxia

At the time of birth out of 92 neonates around 35 neonates had perinatal asphyxia and 45 neonates required Bag and mask resuscitation in delivery room. the table is as follows for both.

Perinatal Asphyxia	No. of cases	Percentage
NO	57	62.0%
YES	35	38.0%
Total	92	100.0%

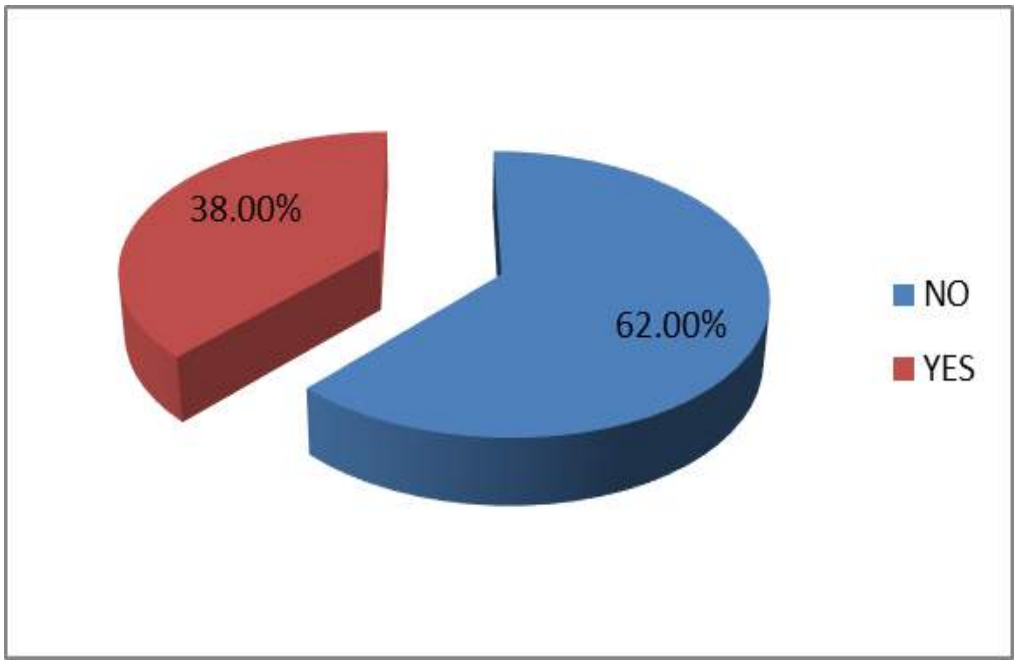

Figure 13: Study population having perinatal asphyxia

Table 10: Neonates required Bag and mask during resuscitation

PNA babies needed BMV resuscitation.

Neonatal Morbidities_Asphyxia needing BMV	No. of cases	Percentage
NO	47	51.1%
YES	45	48.9%
Total	92	100.0%

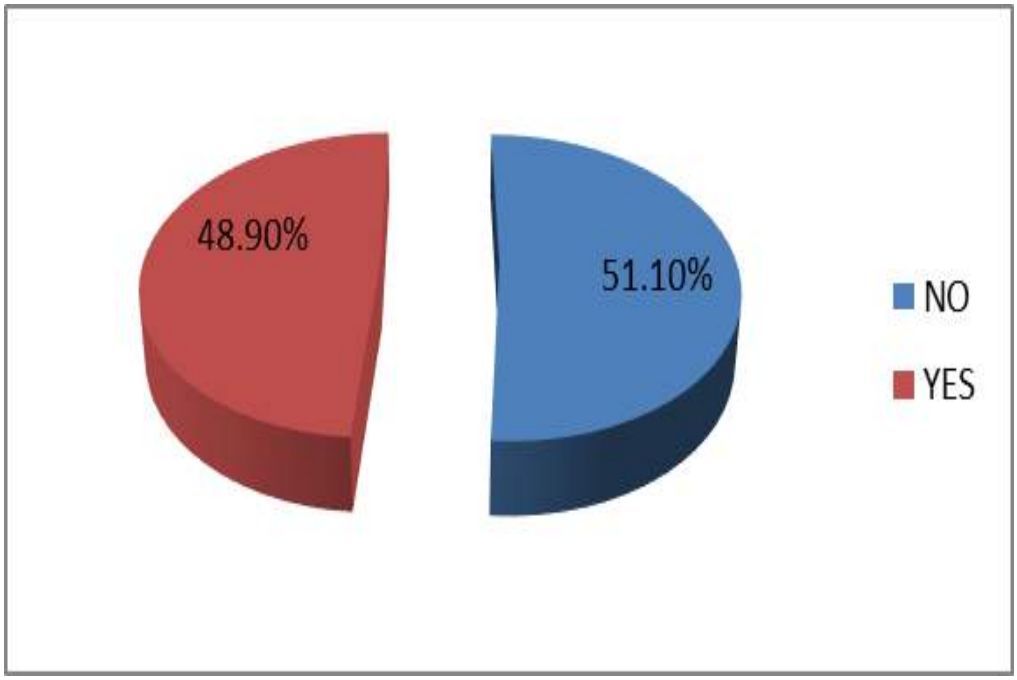

Figure 14: Neonates required Bag and mask during resuscitation

Table 11: Hypoglycemia in study group

Out of whole study group , 42 neonates experienced hypoglycemia at some point of time during hospital stay

Hypoglycemia	No. of cases	Percentage
NO	50	54.3%
YES	42	45.7%
Total	92	100.0%

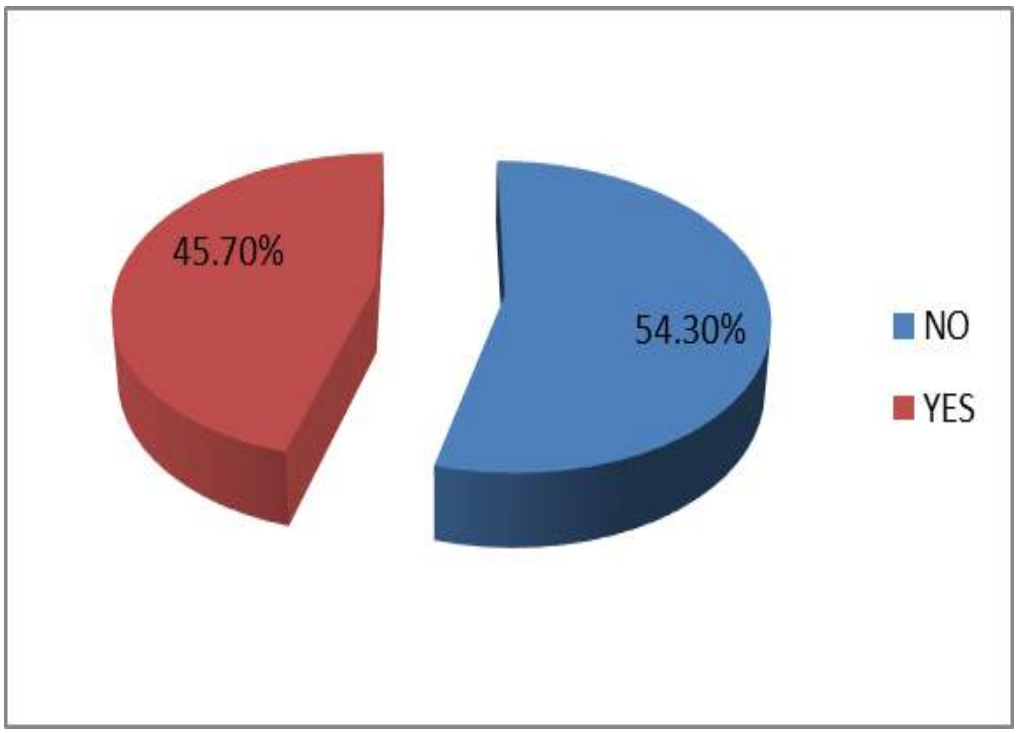

Figure 15: Hypoglycemia in study group

Table 12: Neonates received phototherapy

Out of 92 neonates, 40 had hyperbilirubinemia for which they were given phototherapy

Hyperbilirubinemia	No. of cases	Percentage
NO	52	56.5%
YES	40	43.5%
Total	92	100.0%

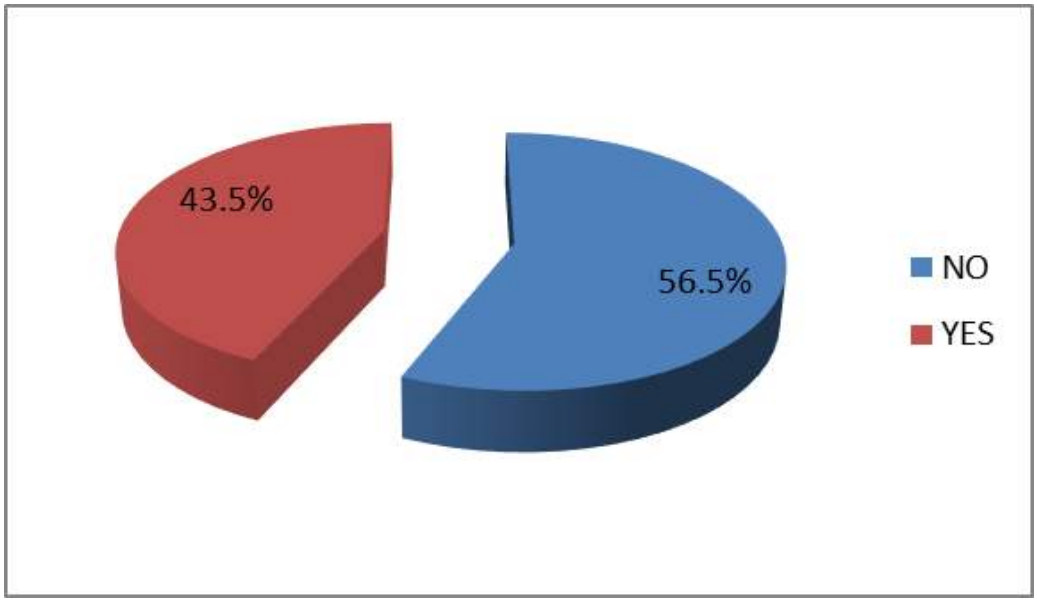

Figure 16: Neonates received phototherapy

Table 13: Neonates suffered with RDS

Now the other major morbiditity in these neonates was Respiratory distress syndrome. In our study out of 92 subjects, 82 had RDS, and out of these 82, the number of neonates received surfactant was 40. Here is the graphical representation:

RDS	No. of cases	Percentage
NO	10	10.9%
YES	82	89.1%
Total	92	100.0%

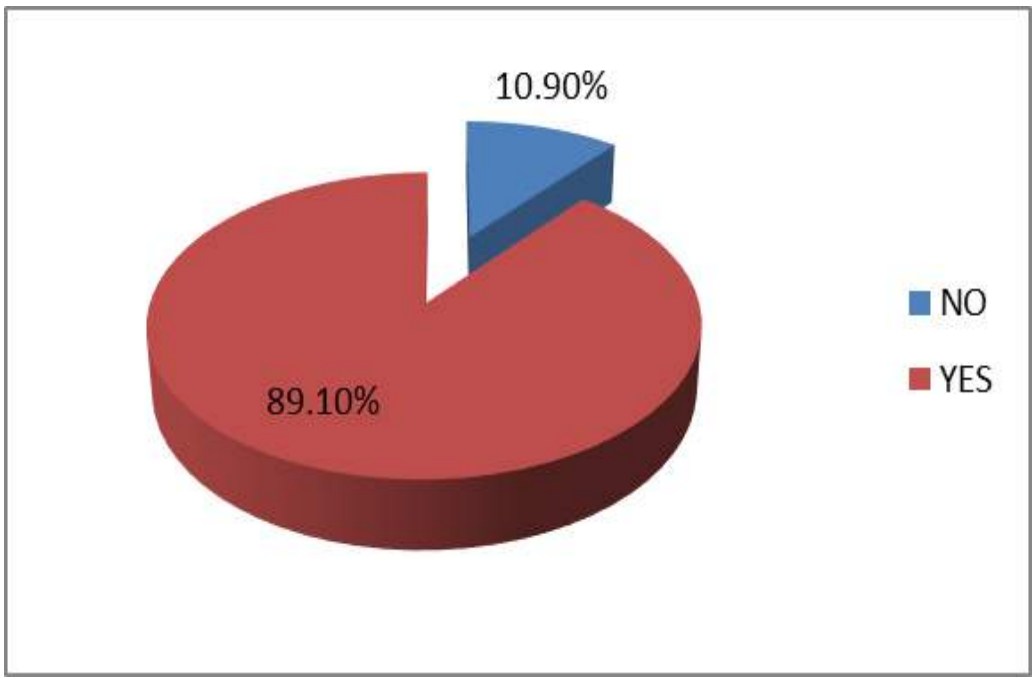

Figure 17: Neonates suffered with RDS

Table 14: Neonates received surfactant

Need for surfactant	No. of cases	Percentage
NO	52	56.5%
YES	40	43.5%
Total	92	100.0%

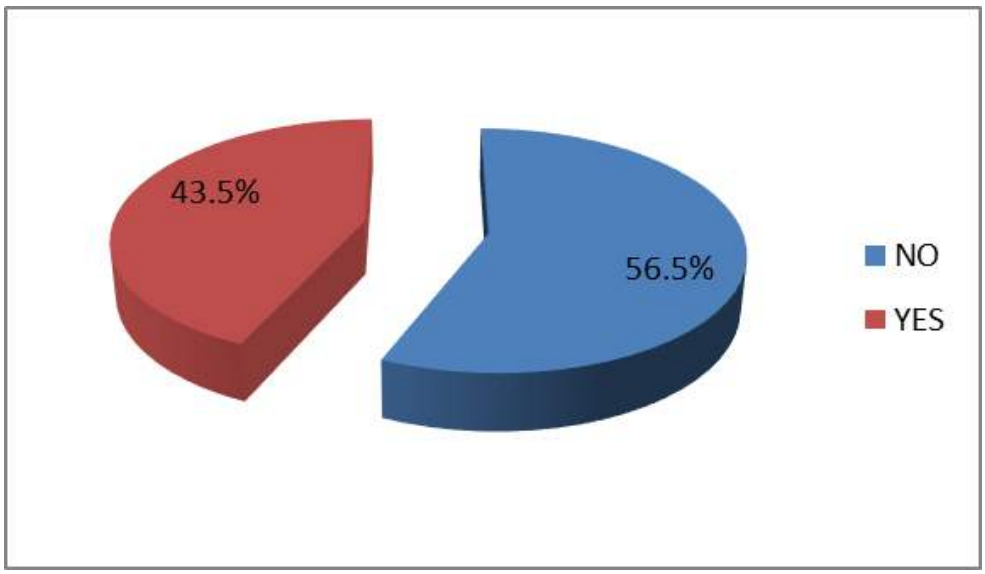

Figure 18: Neonates received surfactant

Table 15: Apnea of prematurity in study group

Other morbidity which encountered in these neonates was occurrence of apnea of prematurity. In our study group out of 92 neonates 55 were experienced AOP.

AOP (Apnea Of Prematurity)	No. of cases	Percentage
NO	37	40.2%
YES	55	59.8%
Total	92	100.0%

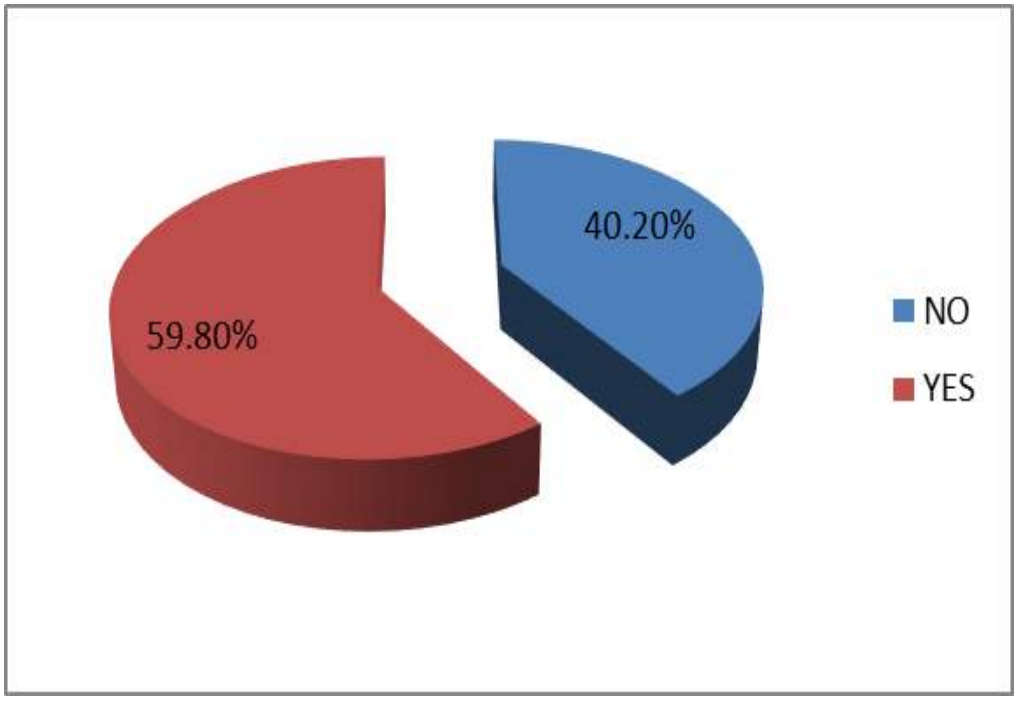

Figure 19: Apnea of prematurity in study group

Table 16: Feed intolerance and study group

The other morbidity which was seen in the selected neonates was feed intolerance and incidence of Necrotising enterocolitis.

Out of 92 neonates 38 had developed feed intolerance, while 28 were suffered from NEC. The graphical representation is as below :

Feed Intolerance	No. of cases	Percentage
NO	54	58.7%
YES	38	41.3%
Total	92	100.0%

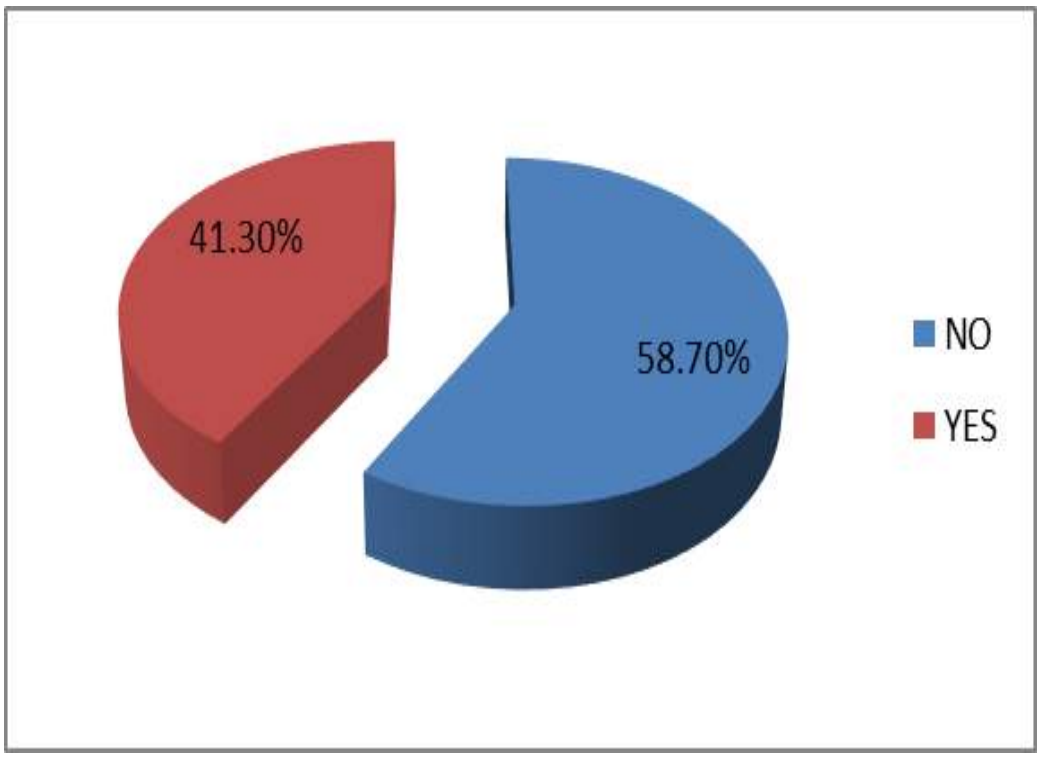

Figure 20: Feed intolerance and study group

Table 17: Study group contracted with NEC

NEC	No. of cases	Percentage
NO	64	69.6%
YES	28	30.4%
Total	92	100.0%

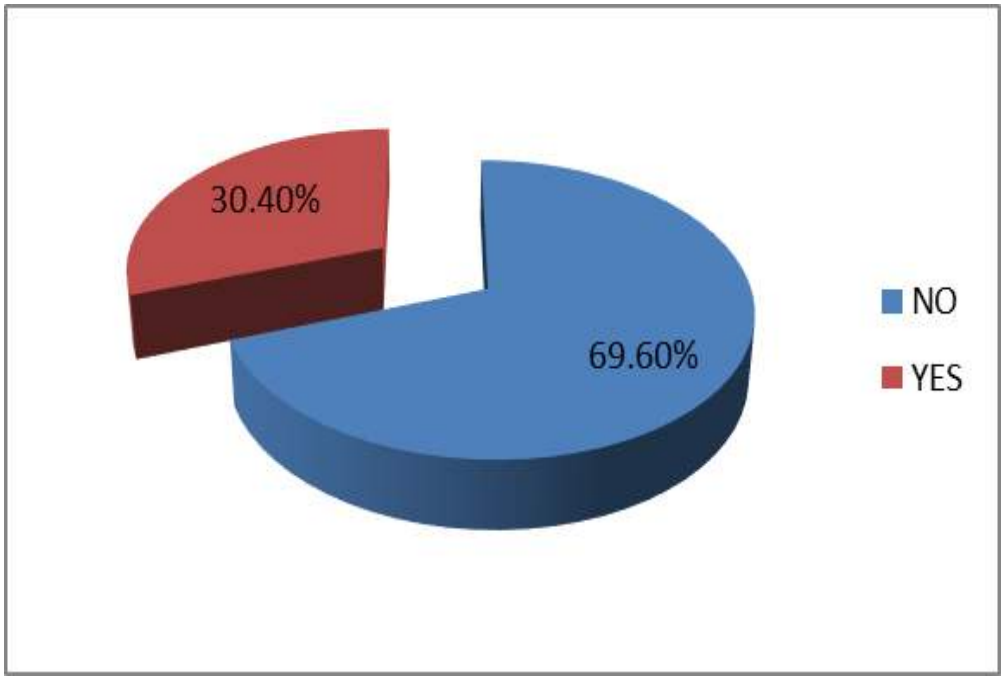

Figure 21: Study group contracted with NEC

Table 18: CPAP requirement in study group

Other requirements during hospital stay was to support the neonates with Nasal bubble cpap for their respiratory distress and to use this respiratory support after post extubation. Out of 92 subjects, 79 were needed to keep on Nasal bubble CPAP.

CPAP	No. of cases	Percentage
NO	13	14.1%
YES	79	85.9%
Total	92	100.0%

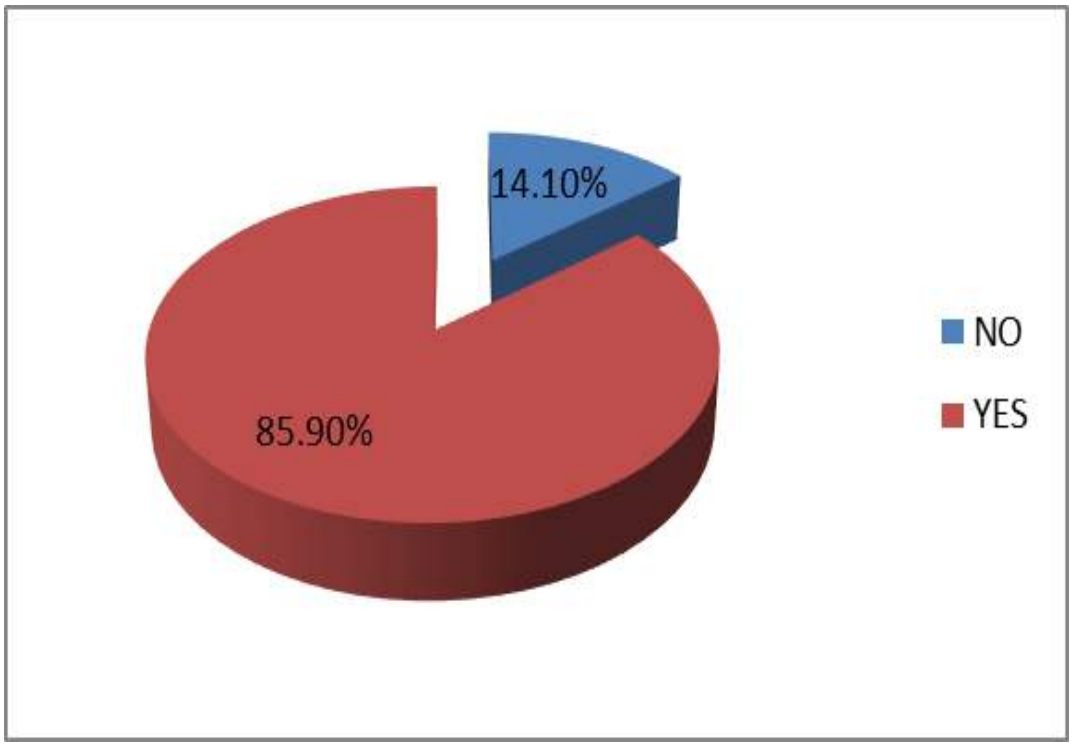

Figure 22: CPAP requirement in study group

Table 19: Neonates with ROP

Neonates were also evaluated for Retinopathy of prematurity. Out of 92 neonates, 23 had ROP, for which they were evaluated further.

ROP	No. of cases	Percentage
NO	69	75.0%
YES	23	25.0%
Total	92	100.0%

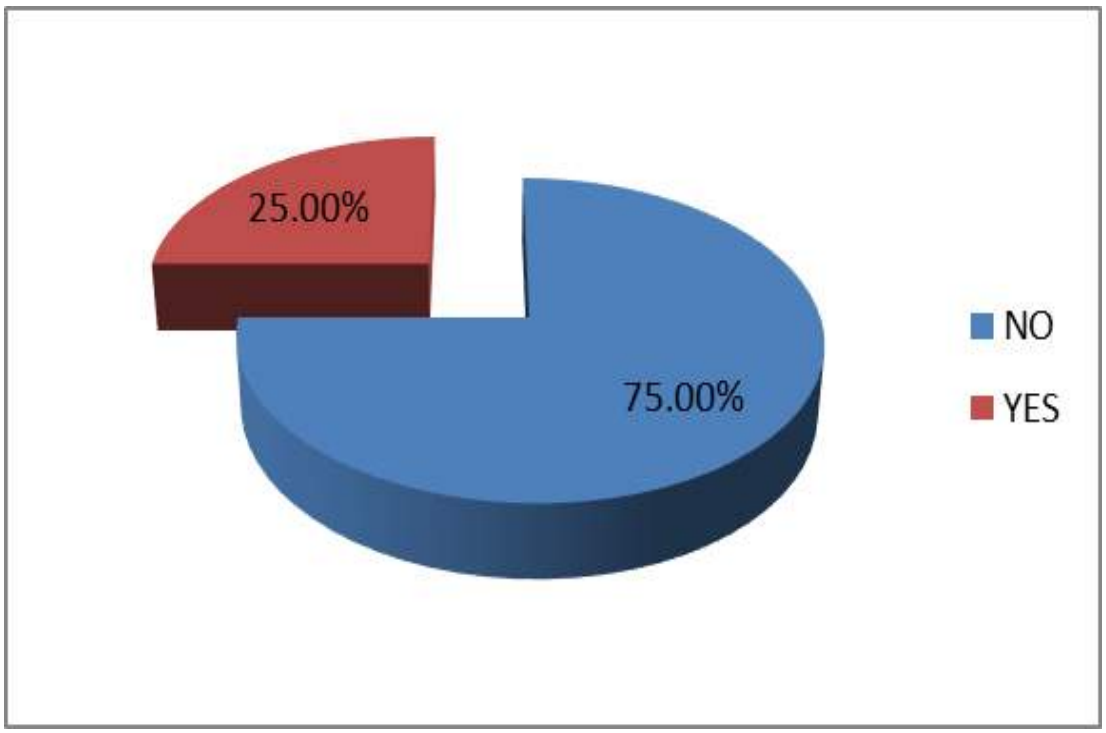

Figure 23: Neonates with ROP

Table 20: Neonates required ventilatory support

The table below represent the need of ventilation in these neonates and the duration of ventilator support according to the affected neonates

Need for ventilation	No. of cases	Percentage
NO	55	59.8%
YES	37	40.2%
Total	92	100.0%

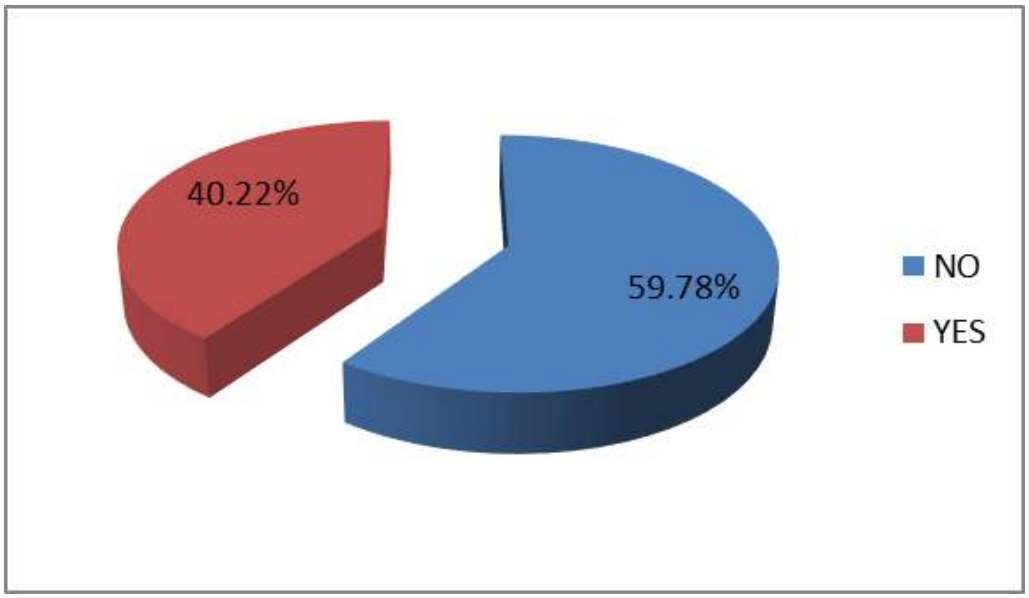

Figure 24: Neonates required ventilatory support

Table 21: Table suggestive of duration of ventilatory support

Duration of Ventilator	No. of cases	Percentage
1	7	7.6%
2	10	10.9%
3	8	8.7%
4	3	3.3%
5	7	7.6%
6	4	4.3%
7	8	8.7%
8	5	5.4%
10	3	3.3%
12	2	2.2%
13	1	1.1%
14	1	1.1%
15	1	1.1%
Total	60	65.2%

Table 22: Ionotropes required in study group

In the admitted neonates, about 31 neonates required ionotropic support during hospital stay out of 92 neonates in the study group

Inotropes	No. of cases	Percentage
NO	61	66.3%
YES	31	33.7%
Total	92	100.0%

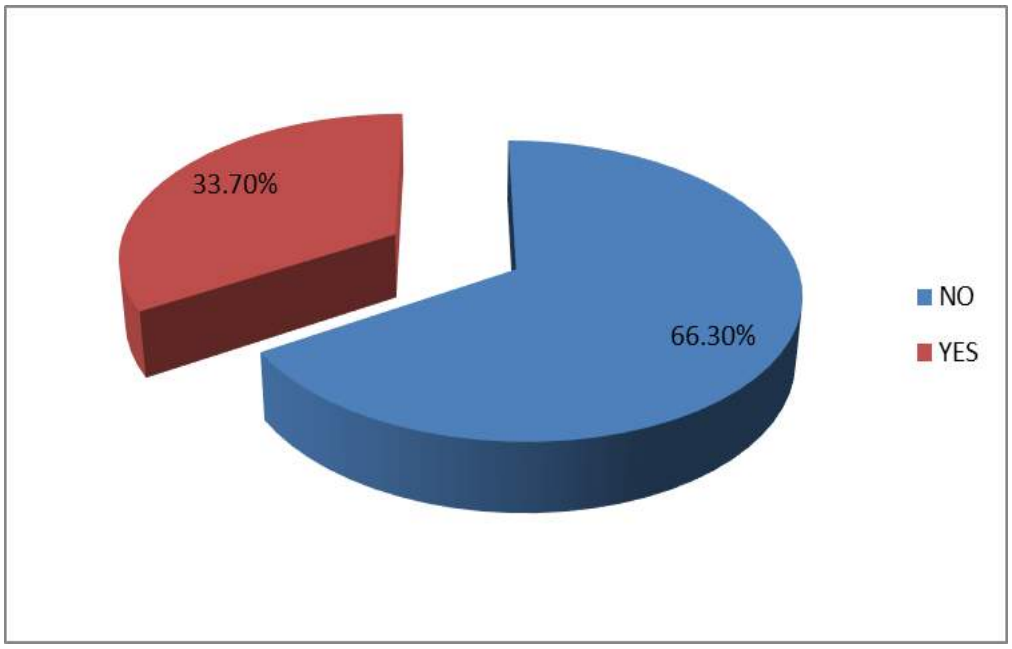

Figure 25: Ionotropes required in study group

Table 23: Final outcome of study group

Now , if we see the outcome of these selected neonates, out of 92 selected, 80 were shifted to pediatric ward nursery, once they got hemodynamically stable, subsequent weight gain for last 3 days and when mother was confident of feeding the baby. 9 neonates were expired and 3 left against medical advice. All these neonates were also included in the study as their duration of hospital stay was more than 10 days, so they met the inclusion criteria a mentioned earlier.

OUTCOME	No. of cases	Percentage
DAMA	3	3.3%
EXPIRED	9	9.8%
SHIFTED	80	87.0%
Total	92	100.0%

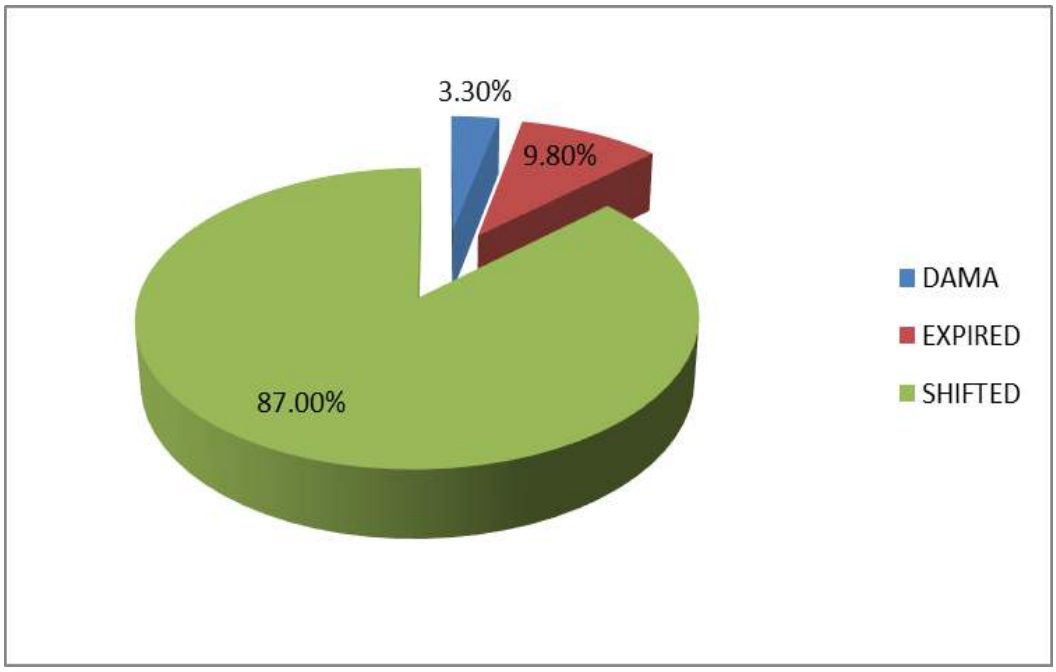

Figure 26: Final outcome of study group

STATISTICAL ANALYSIS:

Among the 92 neonates mean gestational age, mean (SD) was 29.34 (2.37) weeks and among them 27.2 % were found SGA at birth.

Mean birth weight, mean length, mean HC at birth were 1092.1 ± 200.4, 36.7 ± 2.6 and 26 ± 2.0 respectively.

Male are 58.7% and female were 41.3% with a male female ratio 1.42:1

The mean duration of hospital stay 33.2 days (Range 10 – 72 days)

	N	**Minimum**	**Maximum**	**Mean**	**SD**
Duration of hospital stay	92	10	72.0	33.2	13.6
Birth Weight	92	560.0	1470.0	1092.1	200.4

Table 24: Z score at admission and at discharge in study group for weight

The mean Z score for weight at the time of admission was –0.63 ± 0.95.

At the time of discharge these values decreased to -2.14 ± 1.14

Paired T test of study population to show the trend of Z score and p values.

p value found to be < 0.05 which shows that on statistical analysis these differences are significant.

	At admission		At Discharge		t	p-value	Difference		95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Mean	SD	Lower	Upper
B.wt Z - SCORE	-0.63	0.95	-2.14	1.14	17.642	0.000	1.51	0.82	1.34	1.68

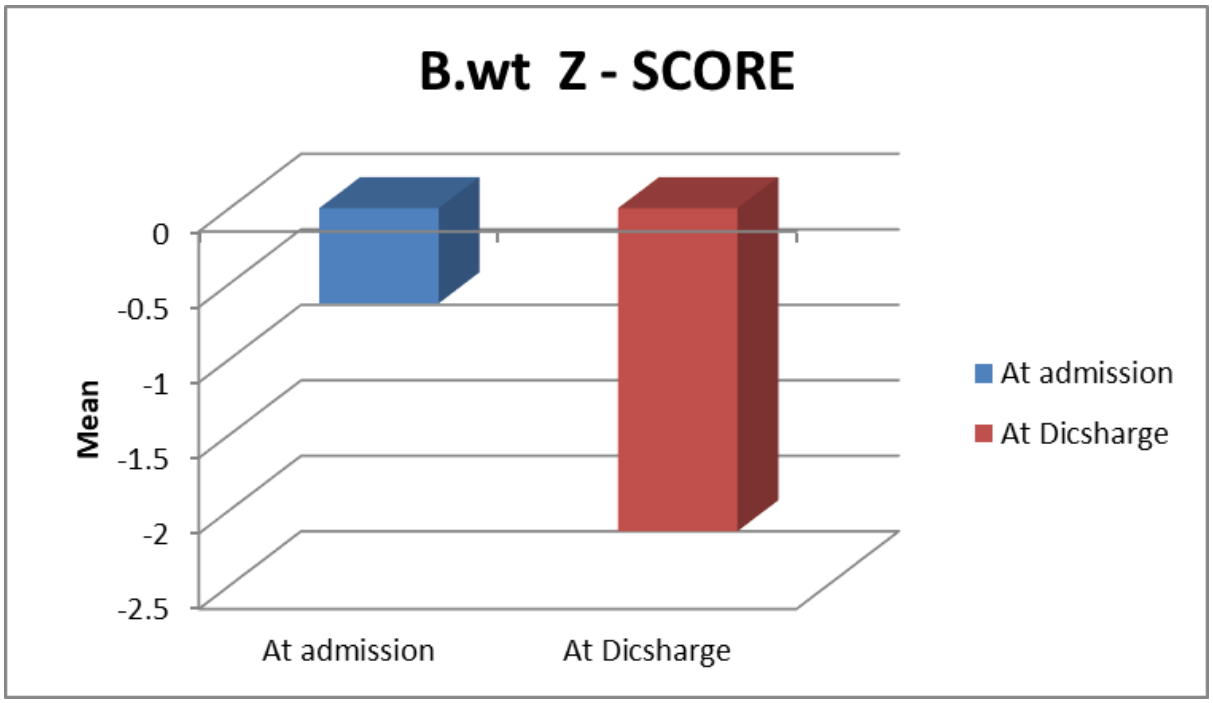

Figure 27: Z score at admission and at discharge in study group for weight

Table 25: Z score at admission and at discharge in study group for length

The mean Z score for length at the time of admission was –0.63 ± 1.09
At the time of discharge these values decreased to -1.27 ± 0.90
p value found to be < 0.05 which shows that on statistical analysis these differences are significant.

	At admission		At Discharge		t	p-value	Difference		95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Mean	SD	Lower	Upper
LENGTH Z - SCORE	-0.62	1.09	-1.27	0.90	8.134	0.000	0.65	0.77	0.49	0.81

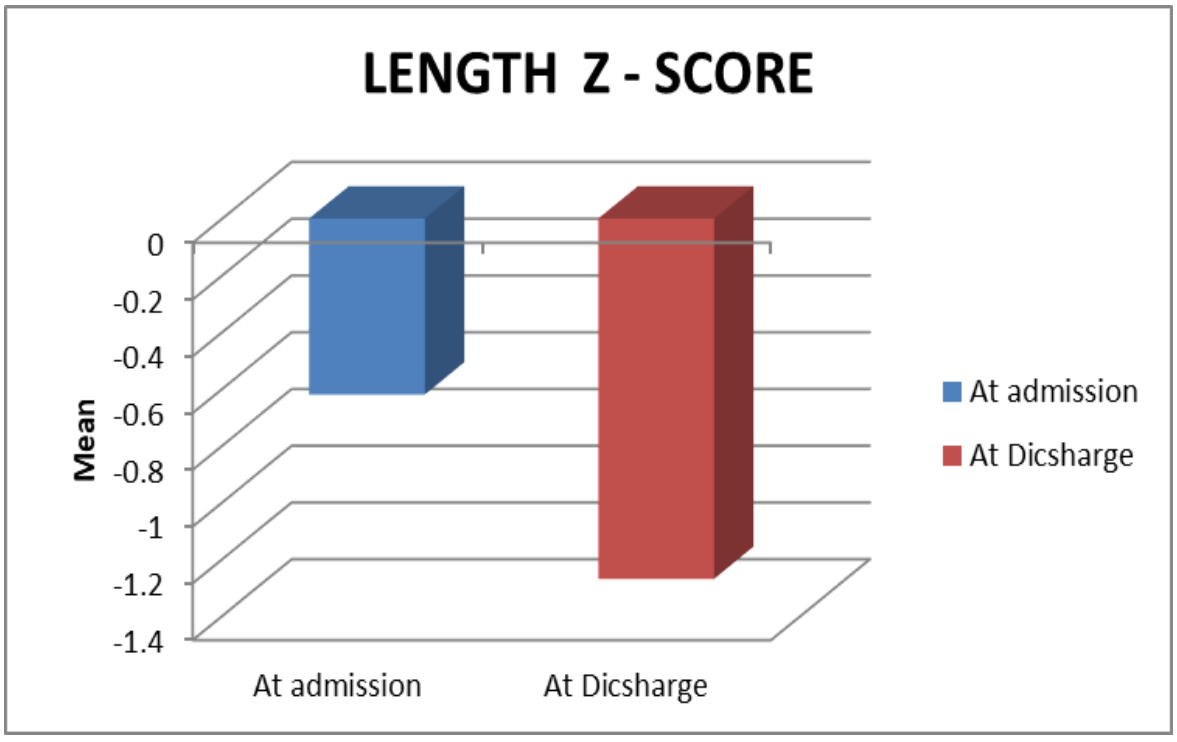

Figure 28: Z score at admission and at discharge in study group for length

Table 26: Z score at admission and at discharge in study group for HC

The mean Z score for HC at the time of admission was -0.54 ± 1.07
At the time of discharge these values decreased to and -1.25 ± 0.89
p value found to be < 0.05 which shows that on statistical analysis these differences are significant.

	At admission		At Dicsharge		t	p-value	Difference		95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Mean	SD	Lower	Upper
HC Z - SCORE	-0.54	1.07	-1.25	0.89	8.338	0.000	0.71	0.82	0.54	0.88

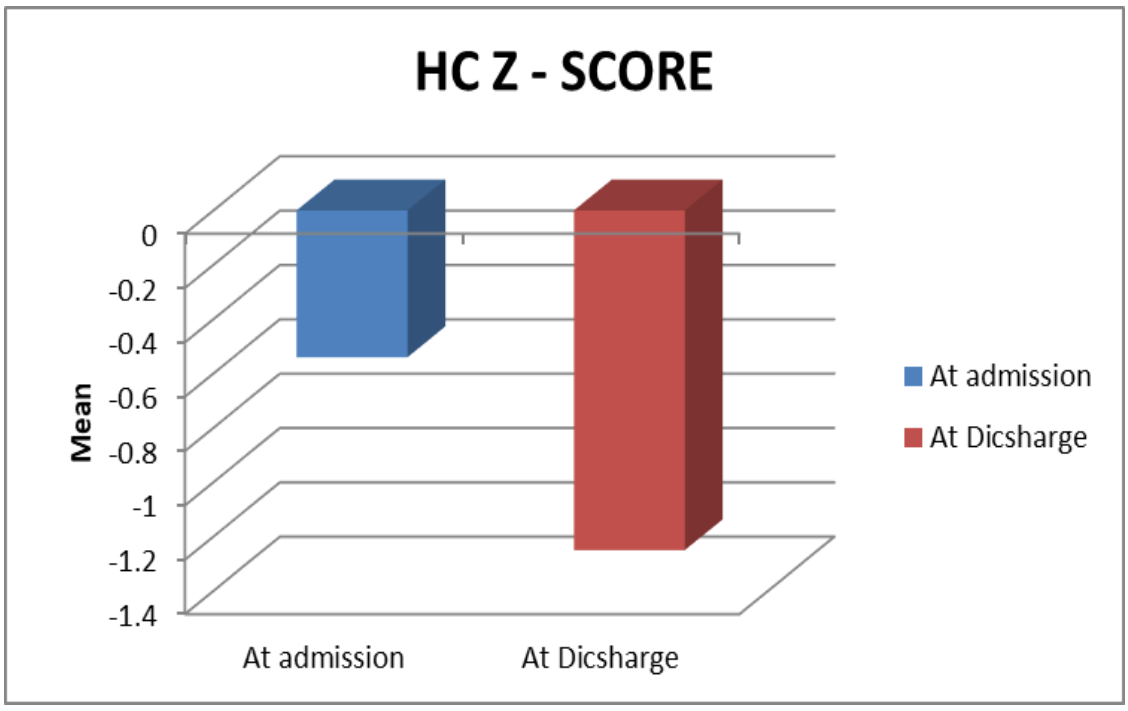

Figure 29: Z score at admission and at discharge in study group for HC

Table 27: Z score in SGA as compare to AGA

The mean fall in Z score for each parameter from birth to discharge were significantly lower in SGA as compared to AGA infants.

Here we can see that the SGA babies has higher reduction in Z score at the time of birth and at the time of discharge both with a significant p value (0.000)

	AGA		SGA		z	p-value
	Mean	SD	Mean	SD		
B.wt	1098.06	204.77	1075.20	188.46	0.486	0.628
B.wt Z - SCORE	-0.23	0.60	-1.73	0.83	9.536	0.000
WT AT DIS	1388.67	228.28	1310.60	179.63	1.540	0.127
WT AT DIS Z - SCORE	-1.78	0.86	-3.11	1.23	5.783	0.000
DIFF WT	290.61	215.52	235.40	176.31	1.145	0.255
DIFF WT Z-SCORE	1.56	0.82	1.38	0.82	0.911	0.365

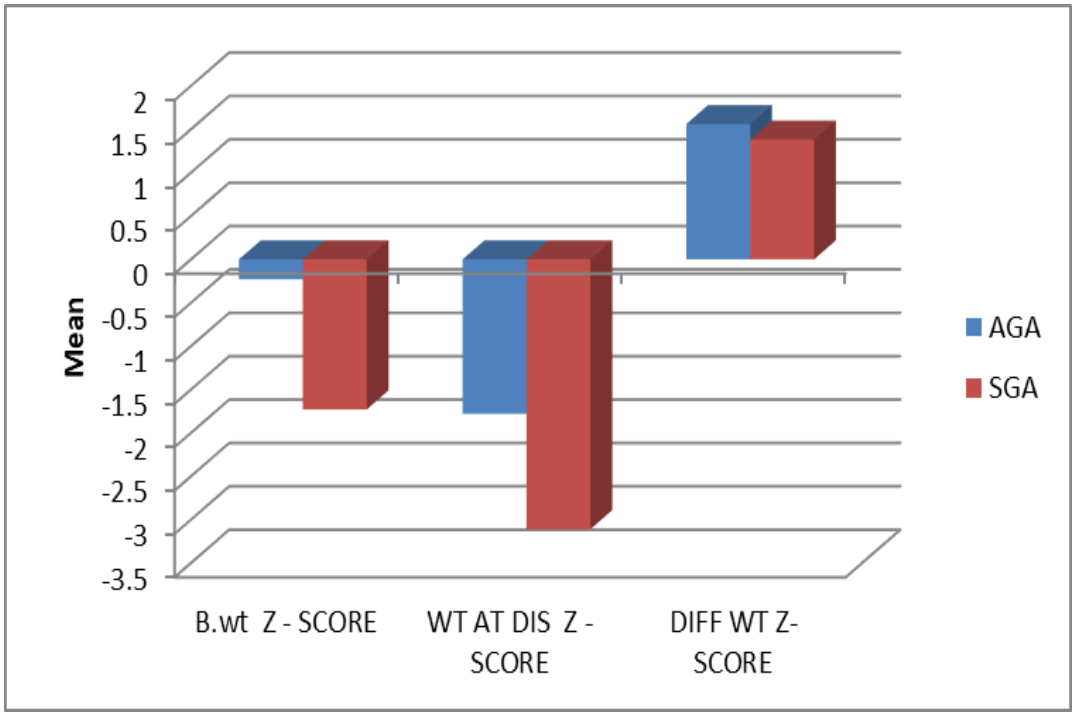

Figure 30: Z score in SGA as comparison to AGA

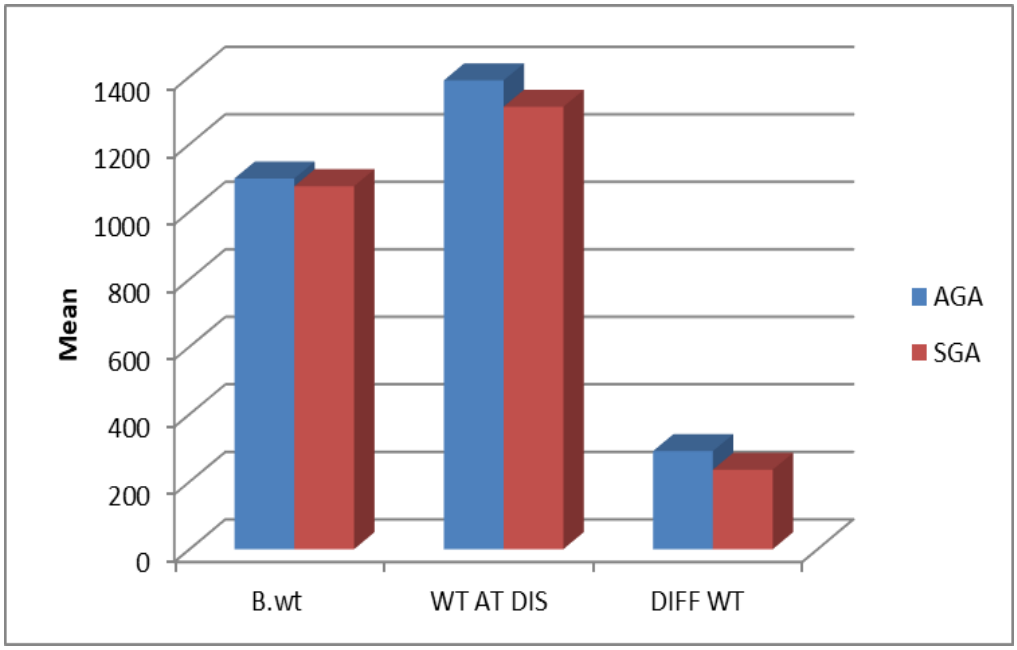

Figure 31: Weight difference at admission and at discharge in both SGA and AGA

Table 28: Z score of HC in SGA as compare to AGA

The same stands true for head circumference also in case of SGA neonates who shows singnificacnt reduction of Z score as compared to AGA

Neonates (p = 0.004)

	AGA		SGA		z	p-value
	Mean	SD	Mean	SD		
HC AT ADM	25.81	1.95	26.68	1.98	-1.894	0.061
HC AT ADM Z - SCORE	-0.20	0.89	-1.43	1.01	5.636	0.000
DIFF HC	3.22	1.74	2.78	1.82	1.075	0.285
DIFF HC Z-SCORE	0.86	0.82	0.31	0.69	2.969	0.004

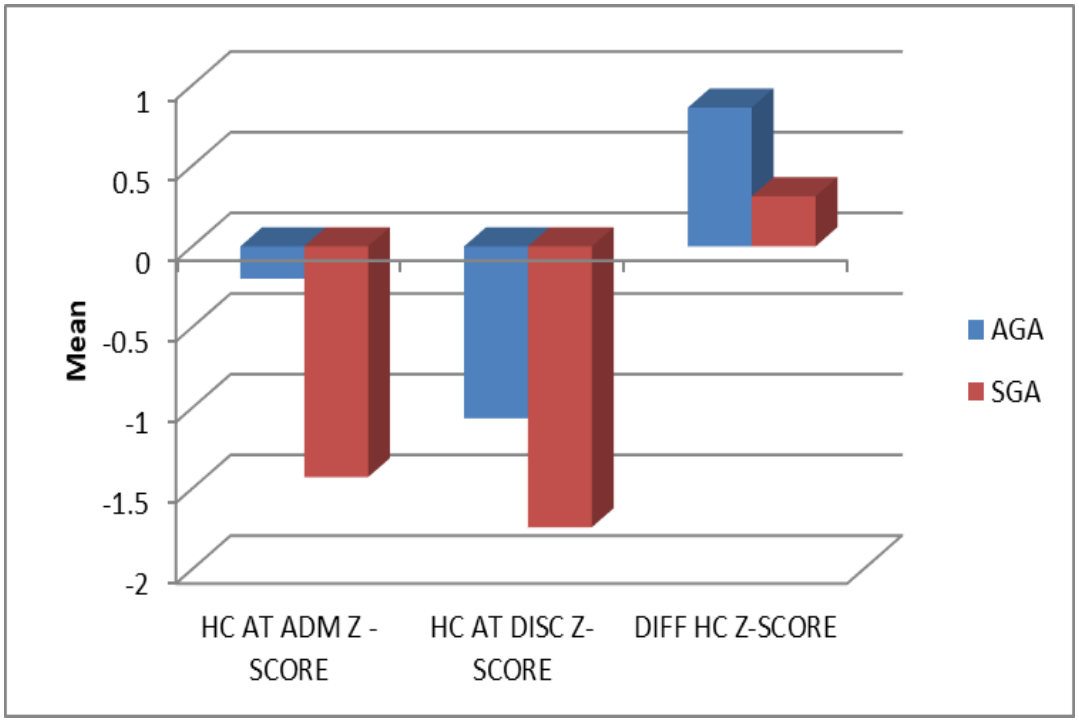

Figure 32: Z score of HC in SGA as compare to AGA

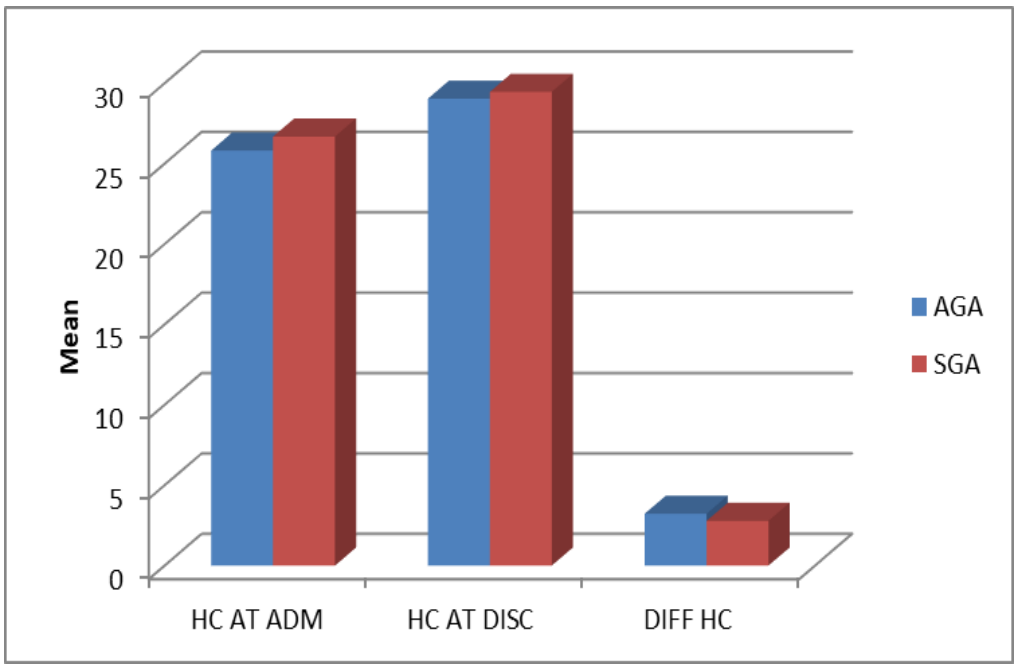

Figure 33: Difference of HC at admission and at discharge in both SGA and AGA

Table 29: Z score in SGA than AGA at discharge

SGA infants also showed significant drop in their Z scores during hospital stay in length also which is presented in table below. Here we see significant p value at birth and at the time of discharge.

	AGA		SGA		z	p-value
	Mean	SD	Mean	SD		
LENGTH AT ADM.	36.57	2.75	37.00	2.25	-0.691	0.491
LENGTH AT ADM. Z - SCORE	-0.24	0.93	-1.63	0.82	6.546	0.000
LENGTH AT DISC	41.21	3.00	41.32	3.21	-0.155	0.877
LENGTH AT DIS Z - SCORE	-1.03	0.84	-1.92	0.76	4.618	0.000
DIFF LENGTH	3.88	2.50	3.44	2.37	0.762	0.448
DIFF LENGTH Z-SCORE	0.79	0.80	0.29	0.55	2.866	0.005

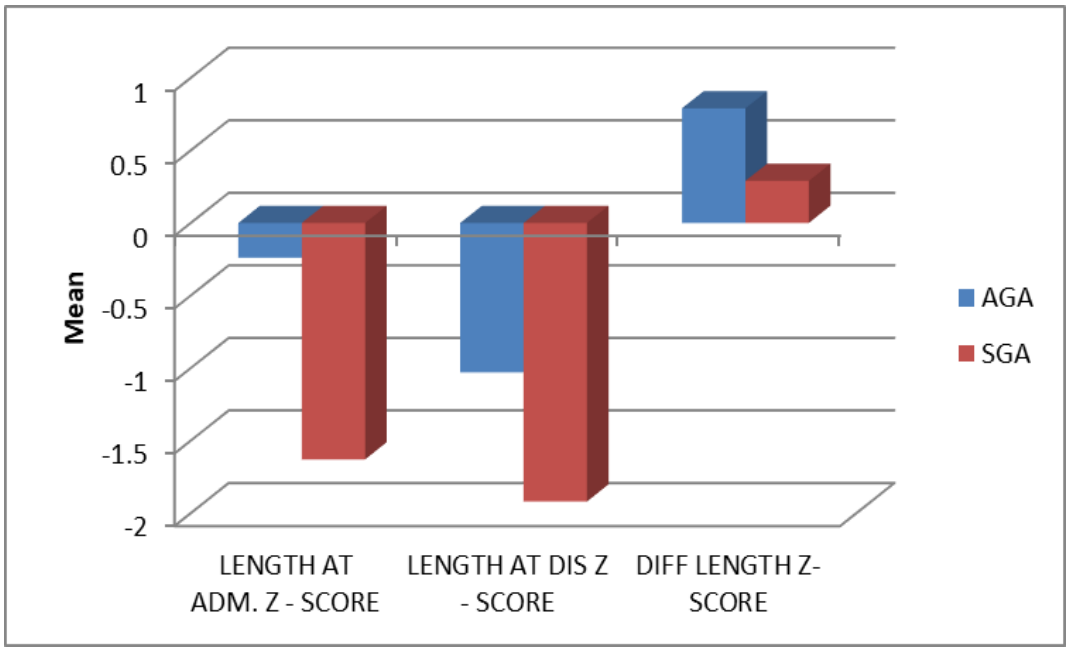

Figure 34: Z score in SGA than AGA at discharge

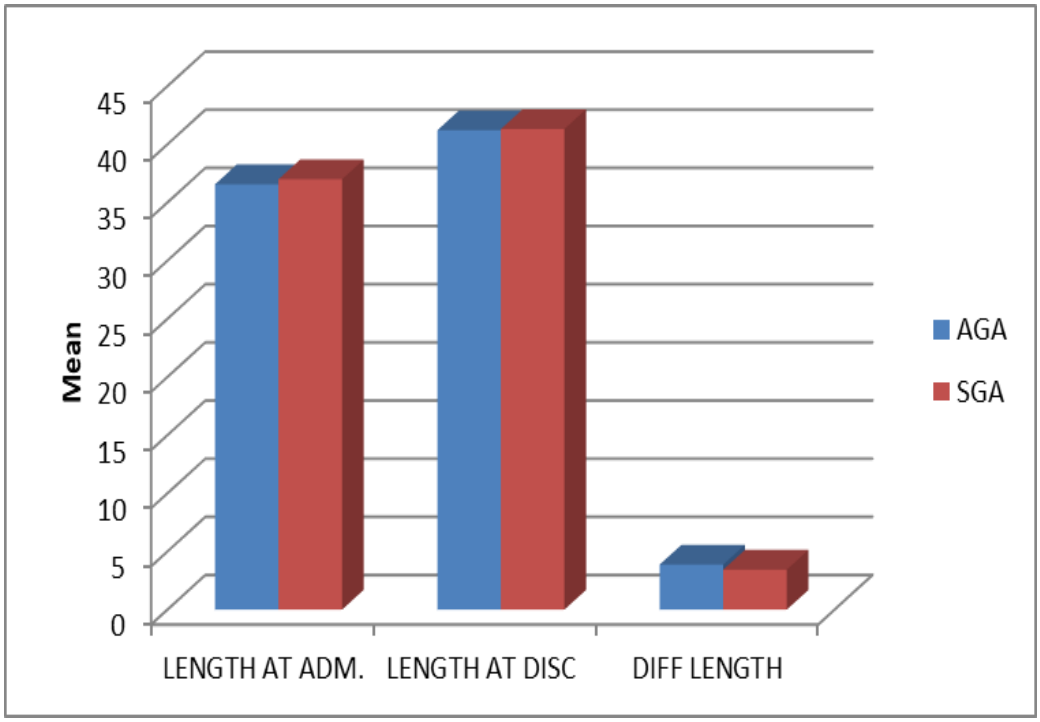

Figure 35: Difference of length measurement SGA and AGA

Table 30: Growth velocity of neonates taken for study.

We found that average daily weight gain or weight gain velocity of this cohort was 16.81 ± 7.37 g/kg/day which was almost comparable to intrauterine growth velocity.

Velocity for length, in average weekly increment in length was 0.76 ± 0.35 and velocity for HC during hospitalization was 0.66 ± 0.23 . This growth velocity was somewhat comparable to intrauterine growth as far as head circumference increment and length increment was concerned.

	N	Minimum	Maximum	Mean	Std. Deviation
DIFF LENGTH/PER WEEK	92	0.00	1.38	0.76	0.35
DIFF HC /WEEK	92	0.00	1.13	0.66	0.23
DIFF Wt./PER DAY	92	-16.11	26.79	7.19	6.07
DIFF Wt. gm/kg/PER DAY	92	2.50	42.10	16.81	7.37

Correlation:

Table 31: Duration of hospital stay and the growth parameters

The table below depicts that the average duration of stay to hospital need not lead to significant increase in weight, head circumference or length in admitted babies as the p value is not found statistically significant here.

		WT AFTER Z - SCORE	HC AT DISC Z- SCORE	LENGTH AT DIS Z - SCORE
Duration of hospital stay	Pearson Correlation	-0.183	0.077	0.042
	p-value	0.081	0.466	0.692
	N	92	92	92

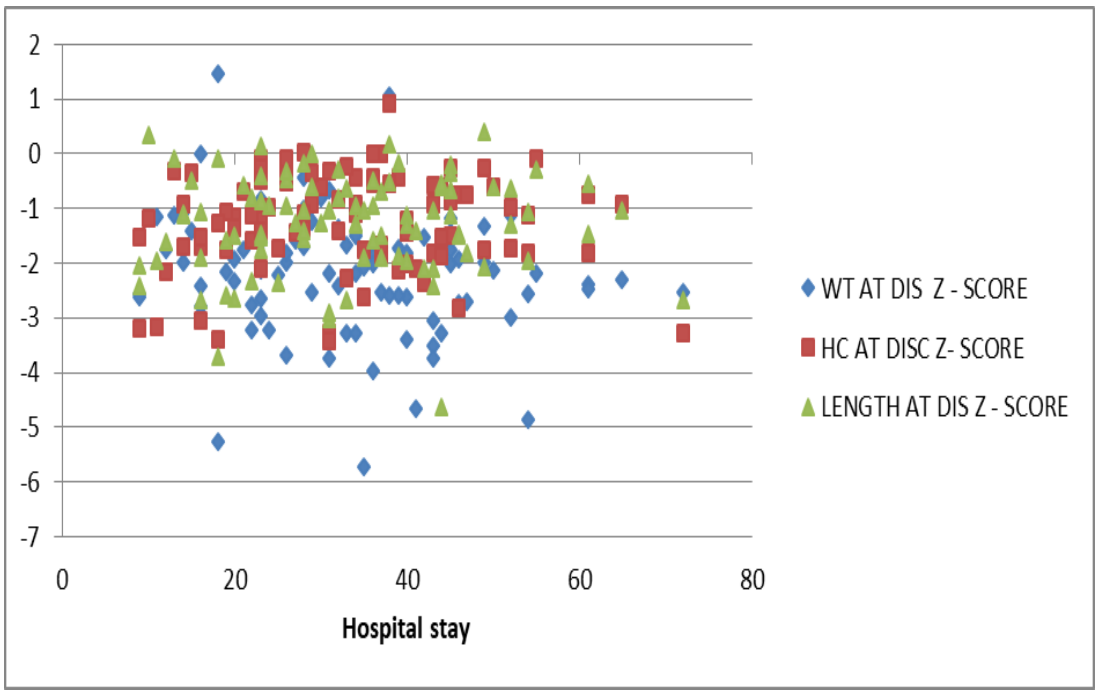

Figure 36: Scatter diagram showing duration of hospital stay and the growth parameters

Table 32: Positive correlation between all the three parameter as age advances

This table of correlation signifies that the head circumference and length has positive correlation with weight gain , as we got significant p value in this case.

		HC AT DISC Z- SCORE	LENGTH AT DIS Z - SCORE
WT AFTER Z - SCORE	Pearson Correlation	0.375	0.500
	p-value	0.000	0.000
	N	92	92

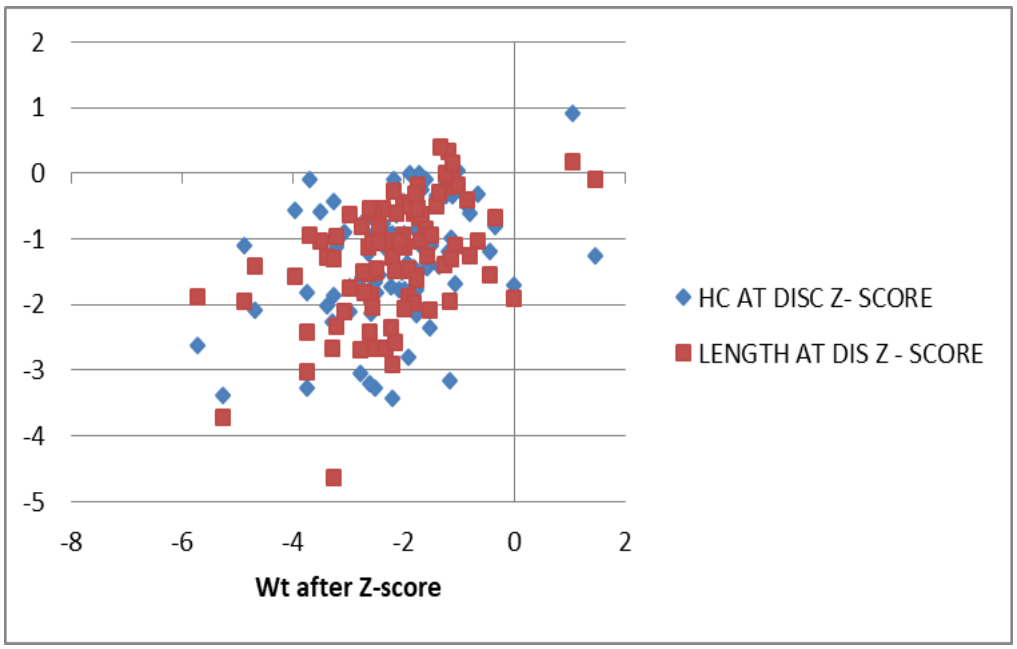

Figure 37: Positive correlation between all the three parameter as age advances

Table 33: Positive correlation between HC and length

The table below also shows positive correlation between head circumference and gain in length as result show significant p value.

		LENGTH AT DIS Z - SCORE
HC AT DISC Z-SCORE	Pearson Correlation	0.702
	p-value	0.000
	N	92

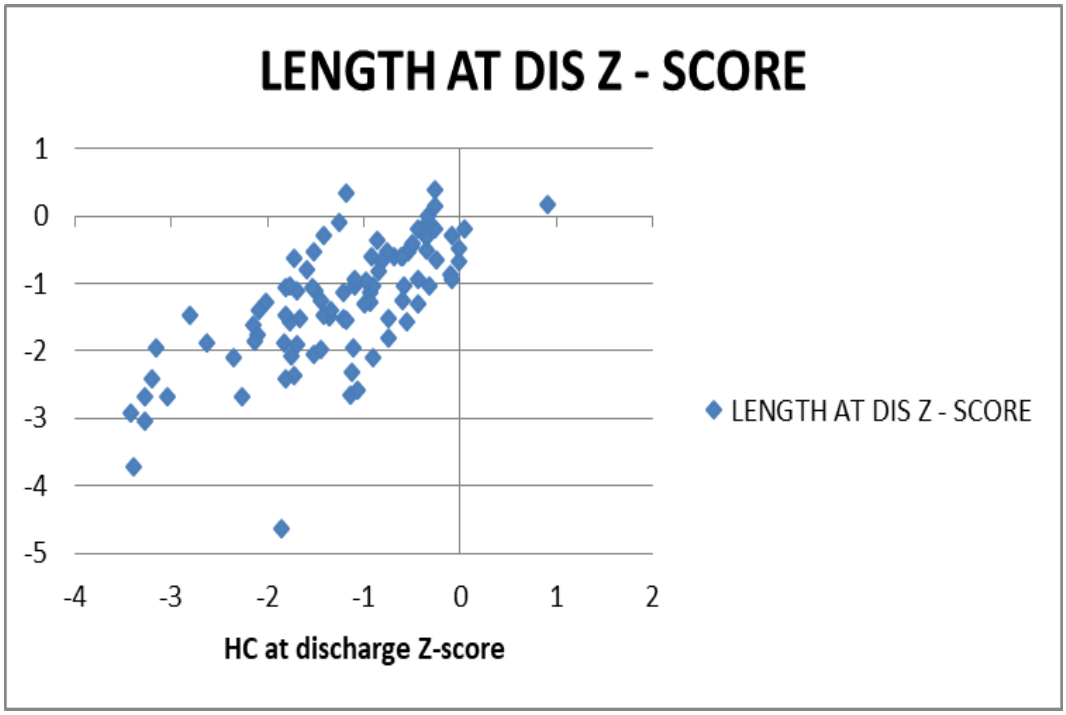

Figure 38:Positive correlation between HC and length

Table 34: Centile, weight at admission and gesational age strata at admission

If we plot these growth trends on fentons 2013 growth chart and study according to centilte during growth, we find the following results:

We have divided the study group in to 3 categories for this

- < 32 weeks infants belong to more than 10 centile of birth weight according to gestational age and at the time as their gestation progresses they drop down to < 3rd centile .
- 32-34 weeks infant mostly belong to 10 centile and some also belong to <10 centile according to gestational age and by the time they grow further their centile drop down to even < 3rd centile
- > 34 week neonates half belong to <3 rd and half belong to >10 centile of birth weight according to gestational age and by the time their gestation advances they continue to grow below 3rd centile.
- In the graphs below the word ‘other’ denotes the centile which lies above 10 (>10th centile)

		Gestation AT ADMISSION						**Total**	**Chi-square value**	**p-value**
		< 32 WK		**32-34 WK**		**> 34 WK**				
birth wt centile GROUP	< 10	4	5.3%	4	33.3%	0	0.0%	8	39.463	0.0001
	< 3	0	0.0%	2	16.7%	2	50.0%	4		
	OTHER	72	94.7%	6	50.0%	2	50.0%	80		
Total		76	100.0%	12	100.0%	4	100.0%	92		

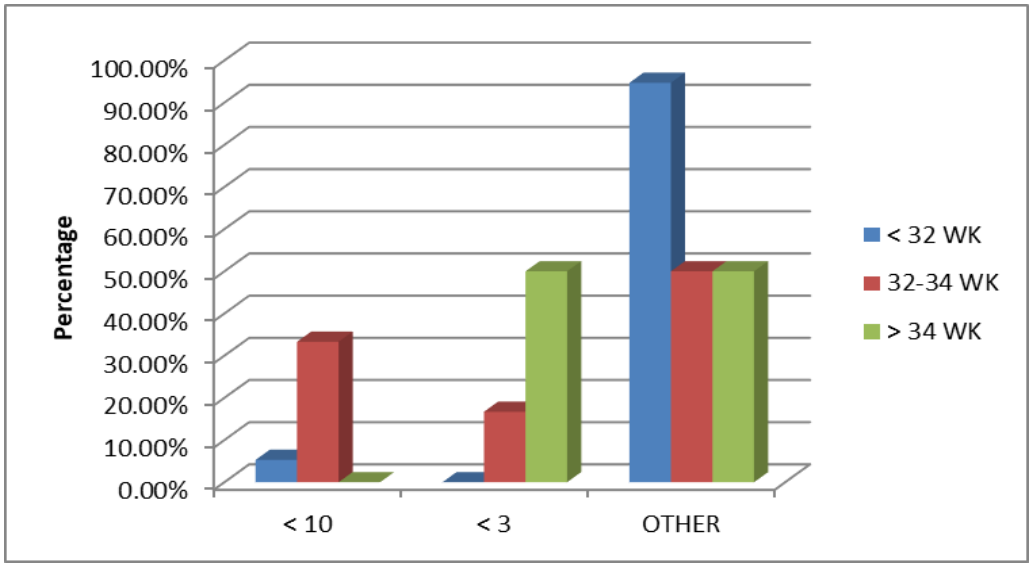

Figure 39: Centile, weight at admission and gesational age strata at admission

Table 35: Centile weight gain and gestation age at the time of shifting

The data are also found to be significant with p value of < 0.05

		Gestation at shifting GROUP						Total	Chi-square value	p-value
		< 32 WK		32-34 WK		> 34 WK				
wt centile at shifting GROUP	< 10	2	20.0%	17	50.0%	4	8.3%	23	57.386	0.0001
	< 3	1	10.0%	7	20.6%	43	89.6%	51		
	OTHER	7	70.0%	10	29.4%	1	2.1%	18		
Total		10	100.0%	34	100.0%	48	100.0%	92		

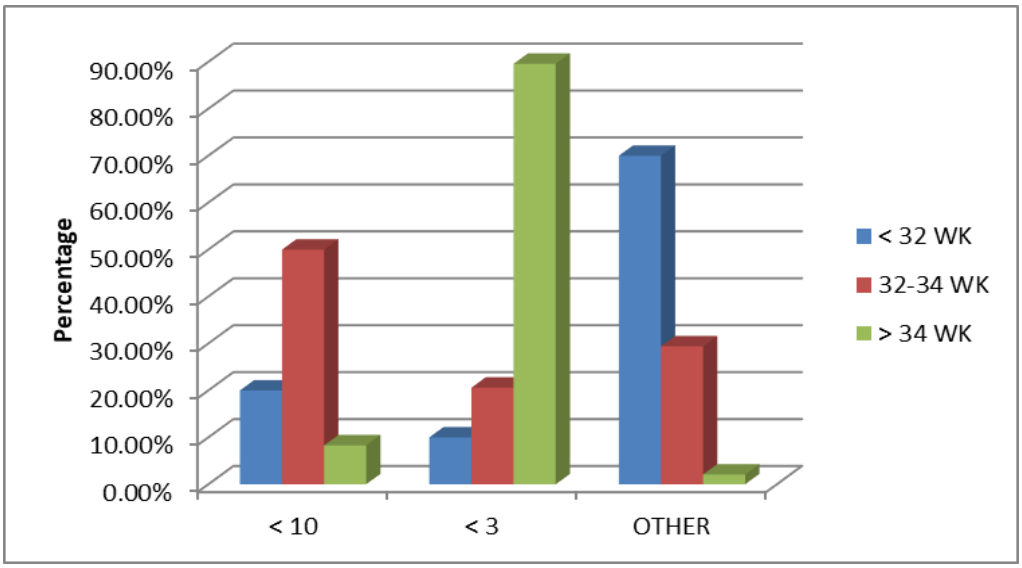

Figure 40: Centile weight gain and gestation age at the time of shifting

Table 36: Gestational strata, centile and length at admission

At birth the length of <32 weeks infants were just more than 10th centile, 32-34 weeks were at also at >10th centile, and >34 weeks at 10th centile. By the time their gestation advances and during discharge half retain at >10 centile and half of them reached at <10th and <3rd centile.

		Gestation AT ADMISSION						Total	Chi-square value	p-value
		< 32 WK		32-34 WK		> 34 WK				
length centile at birth GROUP	< 10	5	6.6%	3	25.0%	0	0.0%	8	24.499	0.0001
	< 3	3	3.9%	5	41.7%	1	25.0%	9		
	OTHER	68	89.5%	4	33.3%	3	75.0%	75		
Total		76	100.0%	12	100.0%	4	100.0%	92		

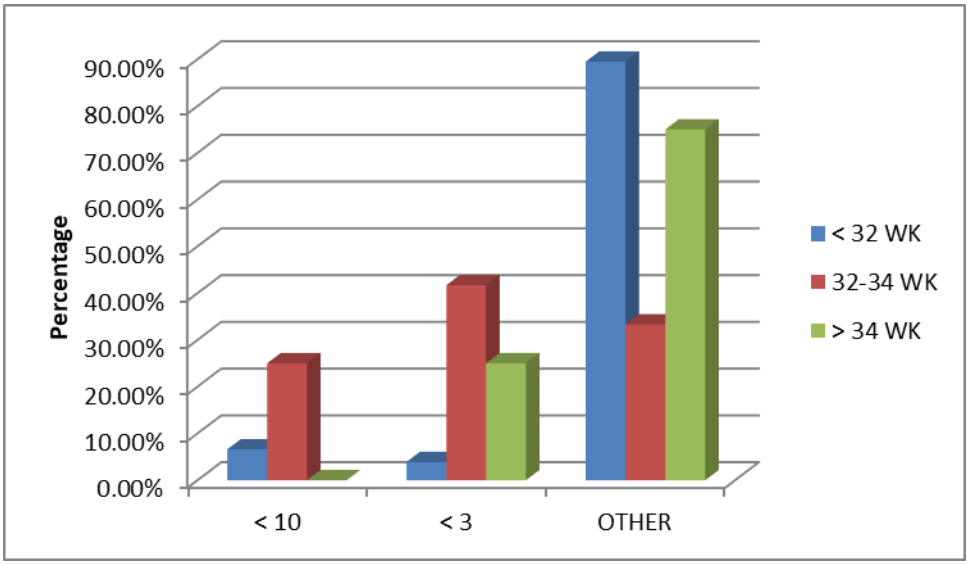

Figure 41: Gestational strata, centile and length at admission

Table 37: Length, gestational age and centile at shifting

		Gestation at shifting GROUP						Total	Chi-square value	p-value
		< 32 WK		32-34 WK		> 34 WK				
length centile at shifting GROUP	< 10	1	10.0%	4	11.8%	11	22.9%	16	2.987	0.560
	< 3	2	20.0%	7	20.6%	12	25.0%	21		
	OTHER	7	70.0%	23	67.6%	25	52.1%	55		
Total		10	100.0%	34	100.0%	48	100.0%	92		

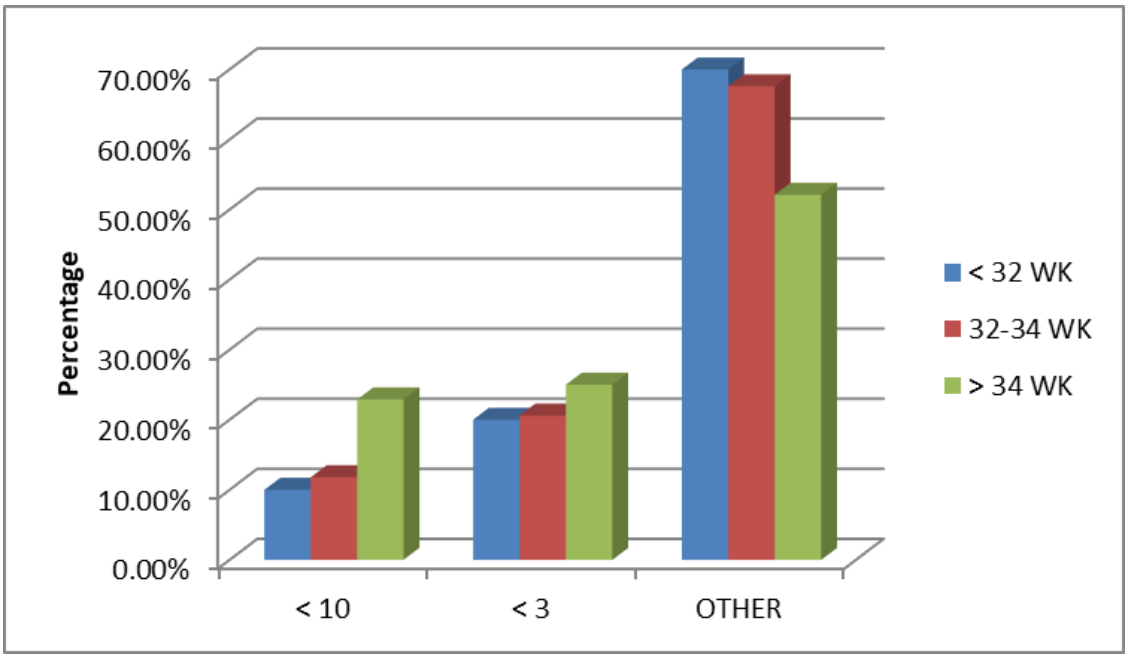

Figure 42: Length, gestational age and centile at shifting

Table 38: HC, centile and gestational age at time of admission

At birth the head circumference of <32 weeks infants were at >10 centile mostly, 32-34 weeks were at >10 centile and <10 centile both, and >34 week neonates were at > 10 th and <3rd centile both, by the time they reach at the point of discharge from NICU, most neonates retain their HC at > 10th centile while few also drop down or continue to grow below 3rd and below 10th centile. This means HC was the parameter among the three which was affected less during hospital stay and showed steady growth.

		Gestation AT ADMISSION						Total	Chi-square value	p-value
		< 32 WK		32-34 WK		> 34 WK				
HC centile at birth GROUP	< 10	7	9.2%	4	33.3%	0	0.0%	11	25.825	0.0001
	< 3	3	3.9%	4	33.3%	2	50.0%	9		
	OTHER	66	86.8%	4	33.3%	2	50.0%	72		
Total		76	100.0%	12	100.0%	4	100.0%	92		

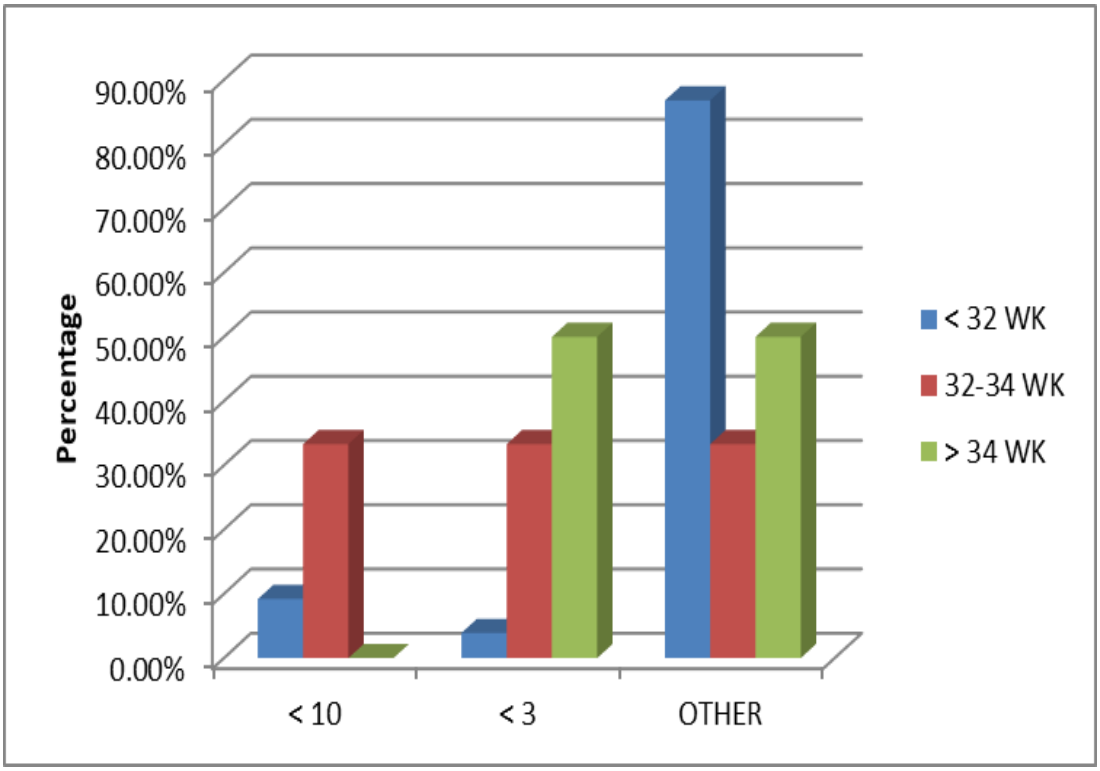

Figure 43: HC, centile and gestational age at time of admission

Table 39: HC, centile and gestational age at the time of shifting

		Gestation at shifting GROUP						Total	Chi-square value	p-value
		< 32 WK		32-34 WK		> 34 WK				
HC centile at shifting GROUP	< 10	1	10.0%	12	35.3%	7	14.6%	20	8.771	0.067
	< 3	3	30.0%	2	5.9%	10	20.8%	15		
	OTHER	6	60.0%	20	58.8%	31	64.6%	57		
Total		10	100.0%	34	100.0%	48	100.0%	92		

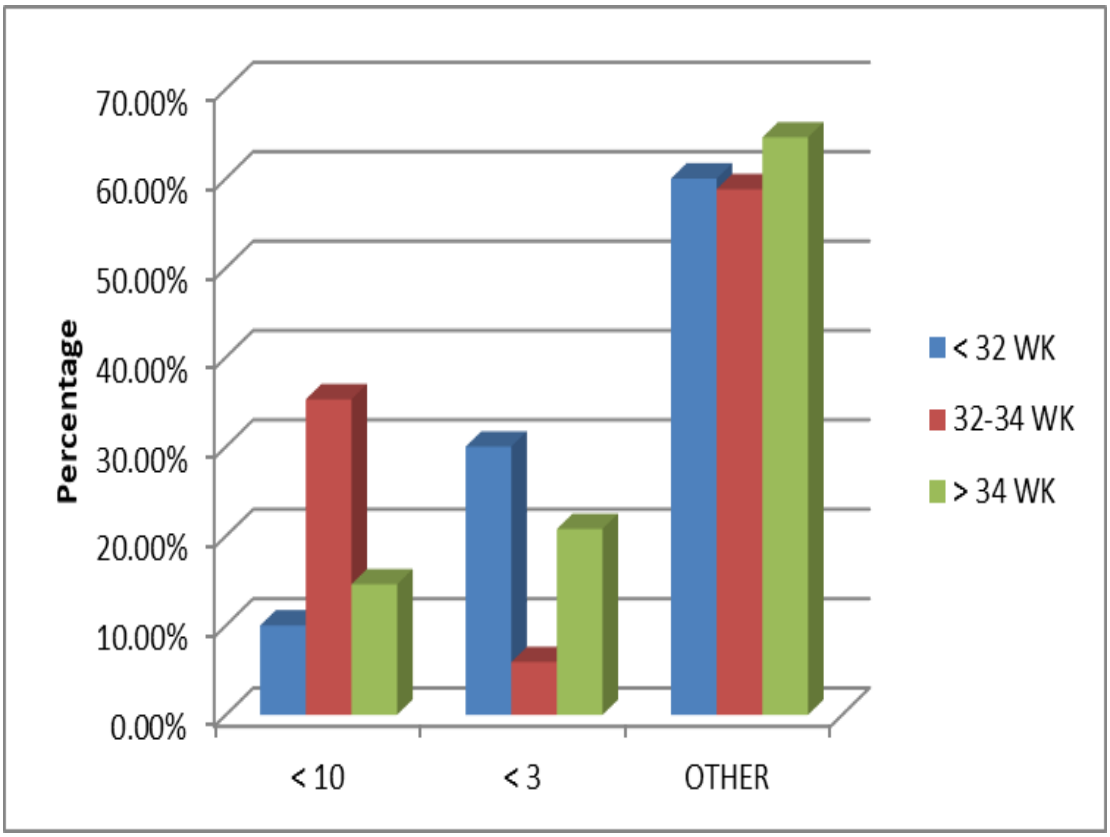

Figure 44: HC, centile and gestational age at the time of shifting

DISCUSSION

This study was planned to assess the postnatal growth of VLBW neonates and it was found that rate of growth retardation is very high in this subgroup of population.

The Z score for weight, length and head circumference was low as compared to Fenton's chart respectively.

Primary outcome was considered as Z score for weight, occipitofrontal circumference and length.

The rate of growth retardation in this subgroup of population was high.

The secondary outcome was to compare the SGA neonates with the AGA neonates it was found that SGA neonates had significant growth lag.

We found a significant decline in our study in all the three anthropometric parameters from birth till discharge from NICU ($p < 0.05$)

Weight in mean Z score in this study declined to -2.14, length and HC up to -1.27 and -1.25 SD. This indicates that weight was affected more but length and head growth was maintained near normal.

When compared with other study as done by M A A Mamun et al. in their cohort weight in Z score declines to -2.01 and length and OFC was maintained above -1.28 [47]

In the study done by Satish saluja et al. the mean Z score were decreased for weight, length, and HC upto -2.16, -2.24, and -1.35 respectively [44]

The study done by Ashish jaiswal et al. they monitored growth and nutritional status till term gestation also found the reduction in mean Z score for weight, length and OFC which was -1.66, -1.98 and -0.84 respectively [65]

Fall in Z score is least for HC, this suggest a brain sparing growth restriction in this cohort.

The mean birth weight was 1292 gm in a study by Rabindran et al [66], 1097 gm by in a study by Trebar B et al [67]. 1140 gm in a study by

Bertino et al[31], 1257 gm in a study by Satish saluja et al[44] and 1364 gm in a study by Fewtrell et al[68]

This variation in the mean birth weight among VLBW babies in the above studies may be due to racial and ethnic differences among the study populations.

The mean birth weight among VLBW babies in our study population was 1091.8 kg. The mean gestational age at birth in our study, mean (SD) was 29.34 (2.37) weeks. it was 29.17 week in studies by Trebar et.al[67], 30.3 weeks in a study by Bertino E et al. [31] and 31 week in the study by Fewtrell et al[68] and 31.7 week in the study by Satish saluja et al[44]

About 58.7% were male in our study as compared to 51.85 in a study by P Khandelwal et al[69], 58.8% in a study by Satish saluja et al[44] which was almost comparable to other studies.

If we considered SGA babies, they continue to grow slow during extra uterine life [31]. In this study we noticed 27.2% of neonates were SGA and had slow growth velocity in all the three parameters. This finding is in contrast to saluja et al.[44] where they find the comparable growth velocity for both SGA and AGA babies.

Study done by Ehrenkranz R A et al. reported faster weight gain in SGA infants[20]

Xjokanma et al., observed that one of the most important factors affecting the quality of postnatal growth of both preterm or with low birth weight babies is the quality of intrauterine growth.[70]

In this study we found the average daily weight gain of 16.81 ±7.37 gm/kg/day which was almost similar with other studies done by saluja et al.[44] and Rathore Ashutosh et al[45], as their average daily weight gain was 15.18 ± 1.7 gm/kg/day and 17.7 ± 7.8 g/kg/day which was comparable to intra uterine growth rates and other reports[20,71,72]

In our study the rate of growth velocity for length and head circumference were also low (0.76 cm/week and 0.66 cm/week respectively) as reported by Lubchenko et.al [28] between 26 and 36 week of gestation (1.1 cm/wk and 0.7 cm/wk respectively)

As we know EUGR is common in VVLBW and ELBW infants. In this study 55% of neonates had EUGR at discharge. In the study done by Radmacher et al.[73] they found 86% of infant affected with EUGR. the possible reason according to them was that, these neonates required significantly more days of assisted ventilation, oxygen and TPN, indicating a higher degree of illness along with high chances to be hypotensive and septic. EUGR infants highly prone to be chonically undernourished, if daily requirement is taken as 120 kcal/kg/day (energy) and 3 gm/kg/day protein, and this was not consistently achieved by either groups. This statement is also supported by the study done by Embleton et al. [59] in which their infants especially those <30 wk of gestation, showed significant cumulative deficit of both protein and energy at discharge.

These studies suggest that, rather than looking at intake on a daily basis, it may be more helpful to assess nutrient deficit in both a cumulative fashion and in terms of nutrient intake needed to overcome these pitfalls. So the main reason which is sought here for EUGR is the failure to consistently provide minimal recommended intake and the resulting development of growth retardation in a large proportion of our NICU graduates.

Study done by Ehrenkranz et al.[40] suggest that in hospital growth velocity improve neurological impairment. As rate of weight gain switch over from 12.0 to 21.2 g/kg/day, it had multifactorial improvement in neurological status. This study suggest that growth velocity during ELBW infants NICU hospitalization exert a significant and possibly independent, effect on neurodevelopmental and growth outcome at 18 to 22 month's corrected age.

In our study out of 92 babies, total 51 neonates had <3rd centile of weight while shifting, which showed that almost 55% neonates in this study had incidence of EUGR. If we compare this with other studies on VLBW the incidence reported for VLBW neonates was 57% by Motoikiro Sakurai et al[74], and 75% by Camila et. al.[40]. 63% 0f VLBW infants were malnourished at 40 weeks corrected gestation in the study by Gianini et al[75]

According to NICHD reports [41] 97% of all VLBW babies and 99% of ELBW babies had weight <10th centile at 36 weeks PMA. These babies subsequently also continue to grow poorly throughout childhood. This growth restriction is believed to persist in adult life as shown by some researchers and they found VLBW infants are twice as likely to have a height <3rd centile at 20 years of age than that of normal weight controls.

The prevalence of malnutrition at discharge in ELBW neonates has been reported as 89% by Steward DK et. al [12]

Jaiswal et al [65] reported that 43% of their VLBW babies were malnourished at term. This was less than our figures. This could be because only 7.5% of their subjects were SGA as compared to 27% of ours. They used the intrauterine growth charts by Singhal et al [76] for Indian infants for weight and those by Ghosh et. al.[77] for length and HC, the anthropometric values of which are lower than those in Fenton's chart used by us.

In our study the fall of Z score from birth to hospital stay was most for weight (-2.14) and least for HC (-1.25). This indicates a brain sparing effect of malnutrition.

Data regarding post discharge growth of VLBW infants is scanty in our country. In a follow up study done at PGI Chandigarh by K Mukhopadhyay et. al.[78] they found similar trend of growth failure till corrected age of one year. At 40 weeks of CA, 85% of VLBW babies were <10th centile. they show some catch up growth by 6 month but again by CA one year 78% were <10th centile probably due to delayed weaning.

Study done by Asish jaiswal et al [65] they noted 43% infants were malnourished. Now another study done by Dinerstein A et al.[79] comparing aggressive nutrition vs conventional nutrition in VLBW infants reported 53% and 77% post natal malnutrition respectively. The lower prevalence of malnutrition in study done by Jaiswal et al.[65] may be attributed to early and aggressive nutrition, ad libitum spoon or palade feeds and universal policy of kangaroo mother care.

In terms of morbidities, the study done by Klevebro S et al.[48] demonstrates differences in postnatal growth patterns in infants developing morbidities and highlights specific postmenstrual weeks with greater differences in growth rate. Infants born at a GA of 25–30 weeks who developed ROP and BPD were smaller at birth. Infants developing NEC and IVH showed a different pattern of prenatal and postnatal growth restriction, indicating a different pathophysiology. We also noted the same pattern.

Slower brain growth during infancy is a predictor of poor neurodevelopment outcome and has been shown to be associated with poor school performance[80,81]. Smaller increments in head circumference during hospital stay in this cohort is cause for concern and there is a need for continued follow up of these infants to monitor for catch up in head growth, along with their cognitive and learning abilities.

VLBW neonates in this study also experienced slow linear growth during hospital stay. They need a long term follow up for catch up, as poor growth during early infancy has been shown to be associated with persistent stunting in later life[12]

SUMMARY AND CONCLUSION

The prospective observational study was conducted in the level III neonatal intensive care unit, in the division of neonatology, Department of Pediatrics, Dayanand medical college and hospital Ludhiana.

- Total 92 neonates were taken for study, out of which 54 (58.7%) were male and 38 (41.3%) were female with male to female ratio of 1.4:1
- Among the 92 neonates mean gestational age, mean (SD) was 29.34 (2.37) weeks and among them 27.2 % were found SGA at birth.
- Mean birth weight, mean length, mean HC at birth were 1092.1 ± 200.4, 36.7 ± 2.6 and 26 ± 2.0 respectively.
- The mean duration of hospital stay 33.2 days (Range 10 – 72 days)
- The mean Z score for weight, length, and HC at birth in all subjects as calculated from the data from fenton's references were –0.63 ± 0.95, -0.62 ± 1.09 and -0.54 ± 1.07 respectively.
- These values decreased to -2.14 ± 1.14, -1.27 ± 0.90 and -1.25 ± 0.89 respectively.
- p value found to be < 0.05 for all the parameters which shows that on statistical analysis these differences are significant.
- The rate of Extrauterine growth retardation (EUGR) in this subgroup of population was high.
- The mean fall in Z score for each parameter from birth to discharge were significantly lower in SGA as compared to AGA infants. This means SGA babies had more growth lag than AGA babies in study population. (p value < 0.05)
- The morbidities like PNA, Severe RDS, hypoglycemia need of ventilator support with duration, feed intolerance, NEC sepsis and ionotropic requirement were also addressed in the study population which was the indispensable part of study and affect the growth outcome as supported by other studies also.

- Weight in mean Z score in this study declines to -2.14 but length and HC was somewhat maintained up to -1.27 and -1.25 SD. this indicates that weight was affected more but length and head growth was maintained near normal.
- Fall in Z score was least for HC, this suggest the brain sparing growth restriction in our cohort study groups.
- Growth velocity for weight was much lower than intrauterine growth velocity as compared with other studies also, so we got the higher rate of extrauterine growth retardation in our sub group.
- The initiation of fluid and feed in all the participants was as per unit protocol. The early initiation of enteral feed was kept in priority.
- Some of the study subjects were expired during study, in this study 9 out of 92 had died and interestingly their duration of hospital stay was quite long. So they were included in study population. The concerned cause for their death was not properly delineated in this study, which is the shortcoming of this study. The reason may be the increased extent of morbidity, culture proven sepsis, longer duration of vasopressor and longer ventilator requirement.
- The mean gestation at admission was 29.34 week, and the mean birth weight at admission was 1092.1 gm.
- In our study 55% of neonates were found to had EUGR at discharge i.e they had weight less than 3 rd centile or their weight fall below 2 Z score.
- In our study, we have shifted our neonates earlier (mean gestation was 34.03 wk) and the mean duration of stay to NICU was 33.2 wk (range 10-72 days), once we compare this from other study. This may be the reason to get the more drop of Z score in our growth parameters.
- Infants were shifted to pediatric ward nursery once they met the shifting criteria when they were clinically stable, on spoon feeds,

euthermic at room temperature, gaining weight at 15-20 g per day for 3 consecutive days and mother was confident of feeding the baby.

CONCLUSION:

- There is high incidence of EUGR in the postnatal period in VLBW neonates.
- There was decrease in all growth parameters among premature neonates at the time of discharge. Despite significant decrease in somatic growth they maintained a near normal head growth.
- Inability to record the time to regain birth weight, Mean age of full enteral feeding, growth pattern between morbidities and lack of information regarding perinatal background were not properly mentioned, which was the shortcoming of our study. Despite these limitations our study provides information about growth rate of premature infants from birth till hospital stay after comparing with fenton's growth chart.
- Long term growth of VLBW infants should be monitored as they are at risk of growth failure.

BIBLIOGRAPHY

1. Organization WH. International statistical classification of disease and related health problems, tenth revision, 2nd ed. World Health Organization; 2004.
2. Mansoor F, Vitkovskaya EN, Yousif J, Kalar MU, Mujeeb E. Effect of Socioeconomic Status and Birth Weight in Infants. International Journal of Innovative Research in Medical Science. 2017;2:750-4.
3. Desmond MM. A review of newborn medicine in America: European past and guiding ideology. Am J Perinatol. 1991;8:308-22.
4. Narayan S. Survival and morbidity in Extremely Low Birth Weight (ELBW) infants. Indian Pediatrics. 2003;40:1305
5. Agostoni C, Buonocore G, Carnielli VP. Enteral nutrient supply for preterm infants: commentary from the European Society of Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition. J Pediatr Gastroenterol Nutr. 2010;50:85–91
6. Hack M, Schluchter M, Cartar L, Rahman M, Cuttler L, Borawski E. Growth of very low birth weight infants to age 20 years. Pediatrics. 2003;112:30-8
7. Clark RH, Thomas P, Peabody J. Extrauterine growth restriction remains a serious problem in prematurely born neonates, Pediatrics, 2003;111;986–90.
8. Lapillonne A, Griffin IJ. Feeding preterm infants today for later metabolic and cardiovascular outcomes. J Pediatr. 2013;162:S7–16.
9. Barker DJ. The fetal and infant origins of adult disease. BMJ. 1990;301:1111
10. Lima PA, Carvalho M, Costa AC, Moreira ME. Variables associated with extra uterine growth restriction in very low birth weight infants. J Pediatr (Rio J). 2014;90:22–7
11. Radmacher P, Rafail S, Adamkin D. Nutrition and growth in VVLBW infants with and without bronchopulmonary dysplasia. Neonatal Intensive Care. 2004;16:22–6.

12. Steward DK, Pridham KF. Growth patterns of extremely low-birth-weight hospitalized preterm infants. J Obstet Gynecol Neonatal Nurs. 2002;31:57–65.
13. Berry MA, Abrahamowicz M, Usher RH. Factors associated with growth of extremely premature infants during initial hospitalization. Pediatrics. 1997;100:640–6.
14. Hay Jr WW. Assessing the effect of disease on nutrition of the preterm infant. Clin Biochem. 1996;29:399–417.
15. Morris BH, Smith KE, Swank PR, Denson SE, Landry SH. Patterns of physical and neurologic development in preterm children. J Perinatol. 2002;22:31–6.
16. Lucas A, Morley R, Cole TJ. Randomised trial of early diet in preterm babies and later intelligence quotient. BMJ. 1998;317:1481–7.
17. Ehrenkranz RA, Dusick AM, Vohr BR, Wright LL, Wrage LA, Poole WK. Growth in the neonatal intensive care unit influences neurodevelopmental and growth outcomes of extremely low birth weight infants. Pediatrics. 2006;117:1253–61.
18. Cooke, R. Postnatal Growth in Preterm Infants: Have We Got it Right?. J Perinatol. 2005;25:S12–4.
19. Fenton TR, Nasser R, Eliasziw M, Kim JH, Bilan D, Sauve R. Validating the weight gain of preterm infants between the reference growth curve of the fetus and the term infant. BMC Pediatrics. 2013;13:92.
20. Ehrenkranz RA, Younes N, Lemons JA, Fanaroff AA, Donovan EF, Wright LL, et al. Longitudinal growth of hospitalized very low birth weight infants. Pediatrics. 1999;104:280-9.
21. [Hay WW Jr, Lucas A, Heird WC, Ziegler E, Levin E, Grave GD, et al. Workshop summary: nutrition of the extremely low birth weight infant. Pediatrics. 1999;104:1360-8.
22. Cooke RJ. Improving growth in preterm infants during initial hospital stay: principles into practice. Arch Dis Child Fetal Neonatal Ed. 2016;101:F366e70

23. Embleton NE, Pang N, Cooke RJ. Postnatal malnutrition and growth retardation: an inevitable consequence of current recommendations in preterm infants? Pediatrics. 2001;107:270–3
24. Serenius F, Källén K, Blennow M. Express Group. Neurodevelopmental outcome in extremely preterm infants at 2.5 years after active perinatal care in Sweden. JAMA. 2013;309:1810–20
25. Knops NBB, Sneeuw CAK, Brand R, Hille ETM, Ouden AL, Wit JM, et al. Catch-up growth up to ten years of age in children born very preterm or with very low birth weight. BMC Pediatr. 2005;5:26-34.
26. Gairdner D, Pearson J. A growth chart for premature and other infants. Arch Dis Child. 1971;46:783–87.
27. Babson SG, Benda GI. Growth graphs for the clinical assessment of infants of varying gestational age. J Pediatr. 1976;89:814–20.
28. Lubchenco LO, Hansman C, Dressler M, Boyd E. Intrauterine growth as estimated from live born birthweight data at 24 to 42 weeks of gestation. Pediatrics. 1963;32:793-800.
29. Brooke OG, Mclntosh N. Birth weights of infants born before 30 weeks gestation. Arch Dis Child. 1984;59:1189-90
30. Karlberg P, Niklasson A, Ericson A. A methodology for evaluating size at birth. Acta Paediatr Scand 1985;319:26-37.
31. Bertino E, Coscia A, Boni L, Rossi C, Martano C, Giuliani F. Weight growth velocity of very low birth weight infants: role of gender, gestational age and major morbidities. Early Hum Dev 2009;85:39-47.
32. Turner C, Carrara V, Thien NA, Paw NM, Rijken M, McGready R, Nosten F. Changes in the body weight of term infants, born in the tropics, during the first seven days of life. BMC Pediatr. 2013;13:93.
33. Asbury J, Orgill AA, Bajuk B, Yu VY, Sequelae of growth failure in appropriate for gestational age, very low birth weight infants. Dev Med Child Neurol. 1986;28:472–9.
34. Cooke RJ, Ainsworth SB, Fenton AC. Postnatal growth retardation: a universal problem in preterm infants. Arch Dis child fetal neonatal Ed. 2004;89;F428–30

35. Jefferis BJ, Power G, Hertzman G, Birth weight, Childhood socioeconomic environment, and cognitive development in the British birth cohort study. BMJ. 2002;325:305.
36. Richards M, Hardy R, Kuh D, Wadsworth ME. Birth weight and cognitive function in the British 1946 birth cohort: longitudinal population based study. BMJ. 2001;322:199-203.
37. Bertino E, Coscia A, Mombro M, Boni L, Rossetti G, Fabris C et al. Postnatal weight increase and growth velocity of very low birth weight infants. Arch Dis Child Fetal Neonatal Ed. 2006;91:F349–56.
38. Sullivan MC, McGrath MM, Hawes K, Lester BM. Growth trajectories of preterm infants: Birth to 12 years. J Pediatr Health Care. 2008;22:83–93.
39. Peterson J, Taylor HG, Minich N, Klein N, Hack M. Subnormal head circumference in very low birth weight children: Neonatal correlates and school-age consequences. Early Hum Dev. 2006;82:325–34
40. Martin CR, Brown YF, Ehrenkranz RA, O'Shea TM, Allred EN, Belfort MB, et al. Nutritional practices and growth velocity in the first month of life in extremely premature infants. Pediatrics. 2009;124:649–57.
41. Hay WW. Early postnatal nutritional requirements of the very preterm infant based on a presentation at the NICHD-AAP workshop on research in neonatology. J Perinatol. 2006;26:S13–8.
42. . Dusick AM, Poindexter BB, Ehrenkranz RA, Lemons JA. Growth failure in the preterm infant: can we catch up? Semin Perinatol. 2003;27:302–10.
43. Ehrenkranz RA, Dusick AM, Vohr BR, Wright LL, Wrage LA, Poole WK. Growth in the neonatal intensive care unit influences neurodevelopmental and growth outcomes of extremely low birth weight infants. Pediatrics. 2006;117:1253–61.
44. Saluja S, Modi M, Kaur A, Batra A, Soni A, Garg P, et al. Growth of Very Low Birth-Weight Indian Infants During Hospital Stay. Indian Pediatr. 2010;47:851-6.

45. Rathore AS, Aiyer SG, Sethi A. Post natal growth pattern of very low birth weight infants up to corrected 40 weeks of gestational age. IAIM. 2016;3:11-20
46. Lee SM, Kim N, Namgung R, Park M, Park K, Jeon J. Prediction of Postnatal Growth Failure among Very Low Birth Weight Infants. Scientific Report. 2018;8:3729.
47. Mamun MAA, Hoque MM, Chowdhury MA, Hossain MM, Shirin M, Ye LL. Study of Premature Infant during Early Period of Life. Northern International Medical College Journal. 2015;7:115-8.
48. Klevebro S, Lundgren P, Hammar U. Cohort study of growth patterns by gestational age in preterm infants developing morbidity. BMJ Open. 2016;6:e012872.
49. Lemons JA, Bauer CR, Oh W, Korones SB, Papile LA, Stoll BJ, et al. Very low birth weight outcomes of the National Institute of Child health and human development neonatal research network. Pediatrics. 2001;107:E1.
50. Fanaroff AA, Stoll BJ, Wright LL, Carlo WA, Ehrenkranz RA, Stark AR, et al. Trends in neonatal morbidity and mortality for very low birthweight infants. Am J Obstet Gynecol. 2007;196:147.e1-8.
51. Gutbrod T, Wolke D, Soehne B, Ohrt B, Riegel K. Effects of gestation and birth weight on the growth and development of very low birthweight small for gestational age infants: a matched group comparison. Arch Dis Child Fetal Neonatal Ed. 2000;82:F208-14.
52. Brandt I, Sticker EJ, Lentze MJ. Catch-up growth of head circumference of very low birth weight, small for gestational age preterm infants and mental development to adulthood. J Pediatr. 2004;144:412.
53. De Curtis M, Rigo J. Extrauterine growth restriction in very-low-birthweight infants. Acta Paediatr. 2004;93:1563-8.
54. Wu YJ, Yu JL, Gu R. Multiple-factor analysis of weight gain in very low birth weight infants. Zhonghua Er Ke Za Zhi. 2005;43:916-9.
55. Were FN, Bwibo NO. Early growth of very low birth weight infants. East Afr Med J. 2006;83:84-9.

56. Loui A, Tsalikaki E, Maier K, Walch E, Kamarianakis Y, Obladen M. Growth in high risk infants <1500 g birthweight during the first 5 weeks. Early Hum Dev. 2008;84:645-50.
57. Growth and the Premature Baby A. Gibson S. Carney J.K.H. Wales, Jessop Wing, Sheffield, and University Department of Paediatrics, Sheffield Children's Hospital, Sheffield. UK Horm Res. 2006;65:75–81.
58. Cooke RJ, Ainsworth SB, Fenton AC. Postnatal growth retardation: a universal problem in preterm infants. Arch Dis Child Fetal Neonatal Ed. 2004;89:F428-30
59. Embleton NE, Pang N, Cooke RJ. Postnatal malnutrition and growth retardation: an inevitable consequence of current recommendations in preterm infants? Pediatrics. 2001;107:270-3.
60. Clark RH, Wagner CL, Merritt RJ, Bloom BT, Neu J, Young TE, et al. Nutrition in the neonatal intensive care unit: how do we reduce the incidence of extrauterine growth restriction? J Perinatol. 2003;23:337-44.
61. Gidi NW, Goldenberg RL, Nigussie AK, McClure E, Mekasha A, Worku B, et al. Incidence and associated factors of extra uterine growth restriction (EUGR) in preterm infants, a cross- sectional study in selected NICUs in Ethiopia. BMJ Paediatrics Open 2020;4:e000765.
62. Elbeely SH, AlQurashi MA. Pre-discharge growth pattern of very low birth weight infants (VLBW): A 5 year single center experience. J Neonatal Perinatal Med. 2021;14:223-8.
63. Ballard JL, Khoury JC, Wedig K, Wang L, Eilers-Walsman BL, Lipp R. New Ballard Score, expanded to include extremely premature infants. J Pediatr. 1991;119:417-23.
64. Fenton TR. A new growth chart for preterm babies: Babson and Benda's chart updated with recent data and a new format. BMC Pediatr. 2003;3:13.
65. Jaiswal A, Reddy A, Gaddam P, Murki S. Growth and nutritional status at corrected term gestational age in very low birth weight infants. Indian J Pediatr. 2011;78:673-8.

66. Rabindran C, Parakh H, Ramesh JK , Reddy P. Association of Postnatal growth with birth weight, gestational age, sex and intrauterine growth in very low birth weight Infants. International Journal of Medical Research and Review. 2015;3:207-15.
67. Trebar B, Traunecker R, Selbmann HK, Ranke MB. Growth during the first two years predicts pre-school height in children born with very low birth weight (VLBW): results of a study of 1,320 children in Germany. Pediatr Res. 2007;62:209-214
68. Fewtrell MS, Cole TJ, Bishop NJ, Lucas A. Neonatal factors predicting childhood height in preterm infants: evidence for a persisting effect of early metabolic bone disease? J Pediatr. 2000;137:668-73.
69. Khandelwal P, Jain V, Gupta AK, Kalaivani M, Paul VK. Association of early postnatal growth trajectory with body composition in term low birth weight infants. Journal of Developmental Origins of Health and Disease. 2014;5:189–96.
70. Xjokanma OF, Egri-Okwaji MTS, Babalola JO. Early postnatal growth of preterm low birth weight, appropriately-sized infants. Nigerian Journal of Clinical Practice. 2008;11:104-10.
71. American Academy of Pediatrics. Committee on Nutritional Needs of Low-Birth-Weight Infants. Pediatrics. 1977;60:519-30.
72. American Academy of Pediatrics. Committee on Nutritional Needs of Low-Birth-Weight Infants. Pediatrics. 1985;75:976-86
73. Radmacher PG, Looney SW, Rafail ST, Adamkin DH. Prediction of extrauterine growth retardation (EUGR) in VVLBW infants. J Perinatol. 2003;23:392-5.
74. Sakurai M, Itabashi K, Sato Y, Hibino S, Mizuno K. Extrauterine growth restriction in preterm infants of gestational age < or =32 weeks. Pediatr Int. 2008;50:70-5.
75. Gianini NM, Vieira AA, Moreira ME. Evaluation of the nutritional status at 40 weeks corrected gestational age in a cohort of very low birth weight infants. J Pediatr (Rio J). 2005;81:34–40

76. Singhal PK, Paul VK, Deorari AK, Singh M, Sundaram KR. Changing trends in intrauterine growth curves. Indian Pediatr. 1991;28:281-3
77. Ghosh S, Bhargava SK, Madhavan S, Taskar AD, Bhargava V, Nigam SK. Intra-uterine growth of North Indian babies. Pediatrics. 1971;47:826-830
78. Mukhopadhyay K, Narang A, Majajan R. Growth in the first year life of very low birth weight and extremely low birth weight babies - Indian Experience. Abstract presented in Pedicon. 2009
79. Dinerstein A, Nieto RN, Solano CL, Perez GP, Otheguy LE, Larguia AM. Early aggressive nutritional strategy will decrease postnatal growth failure in VLBW infants. J Perinatol. 2006; 26:436–42.
80. Powls A, Botting N, Cooke RWI, Pilling D, Marlow N. Growth impairment in very low birthweight children at 12 years: correlation with perinatal and outcome variables. Arch Dis Child. 1996;75:F152-7.
81. Hack M, Breslau N, Weissman B, Aram D, Klein N, Borawski E. Effect of very low birth weight and subnormal head size on cognitive abilities at school age. N Engl J Med. 1991;325:23.

S.No.	MRD	DOB	DOA	Duration of hospital stay	Gender	Growth (AGA/SGA/LGA)	Gestation at birth	Mode of Delivery (VD/VD Assisted/LSCS)	Birth Weight	gestation at shifting	birth wt centile	wt centile at shifting	HC centile at birth	HC centile at shifting	length centile at birth	length centile at shifting	APGAR (1,5 min)	Prematurity
1	846402	08-11-2019	09-11-2019	72 days	male	AGA	26 wks	VD	800 gm	36+2	40	< 3rd	59	3rd	11	<3	not known	extreme preterm
2	854576	23-11-2019	23-11-2019	45 days	female	AGA	24+2 wks	VD	800 gm	30+5	94	64	31	50	37	50	1,4	extreme preterm
3	873175	27-12-2019	27-12-2019	14 days	male	AGA	31+4 wks	LSCS	1400 gm	33+5	20	<3	50	18	17	13	6,9	yes
4	873176	27-12-2019	27-12-2019	33 days	female	SGA	31+4 wks	LSCS	1130 gm	36+2	15	<3	27	<3	<10	<3	8,9	yes
5	873177	27-12-2019	27-12-2019	23 days	male	SGA	31+4 wks	LSCS	1140 gm	34+6	<10	<10	25	15	<10	<10	8,9	yes
6	873605	28-12-2019	28-12-2019	20 days	male	AGA	31+6 wk	LSCS	1430 gm	34+5	18	<3	20	13	13	<3	5,7	yes
7	873609	28-12-2019	28-12-2019	19 days	male	AGA	31+6 wk	LSCS	1470 gm	34+4	21	<3	<10	14	<3	<3	8,9	yes
8	876438	04-01-2020	04-01-2020	37 days	male	AGA	28 wk	LSCS	1100 gm	33+2	54	3	33	3	27	3	8,9	yes
9	878192	08-01-2020	08-01-2020	22 days	female	AGA	31+5 wk	LSCS	1200 gm	34+6	12	<3	23	<10	24	21	8,9	yes
10	880050	11-01-2020	11-01-2020	22 days	male	SGA	32+6 wk	LSCS	1160 gm	36	<3	<3	<10	13	<3	<3	8,9	yes
11	880247	13-01-2020	13-01-2020	23 days	male	SGA	32 WK	LSCS	1180 gm	35+2	<10	<3	<10	<3	<3	<10	6,9	yes
12	879441	10-01-2020	10-01-2020	20 days	male	AGA	30+3 wk	LSCS	1275 gm	33+2	27	3rd	26	<10	13	<10	8,9	yes
13	879443	10-01-2020	10-01-2020	26 days	female	AGA	30+3 wk	LSCS	1300 gm	34+1	40	<3	67	30	64	33	8,9	yes
14	884749	21-01-2020	21-01-2020	44 days	female	AGA	27+3 wk	LSCS	1095 gm	33+5	77	3 rd	82	27	91	27	6,8	yes
15	885298	22-01-2020	22-01-2020	27 days	male	AGA	29 WK	LSCS	1260 gm	32+6	56	<10	48	<10	37	10	6,8	yes
16	886494	24-01-2020	24-01-2020	18 days	female	SGA	36+4 wk	LSCS	1200 gm	39+1	<3	<3	<,3	<3	<3	<3	7,8	yes
17	886215	24-01-2020	24-01-2020	37 days	male	AGA	29+1 wk	LSCS	1160 gm	34+3	38	<3	58	<10	50	<10	8,9	yes
18	886216	24-01-2020	24-01-2020	40 days	male	AGA	29+1 wk	LSCS	1130 gm	34+6	33	<3	44	11	50	13	8,9	yes
19	887337	27-01-2020	27-01-2020	19 days	male	AGA	32+3 wk	VD	1460 gm	33+3	10	<10	<3	<10	<10	<10	7,9	yes
20	885204	22-01-2020	22-01-2020	65 days	male	AGA	26 wks	VD	800 gm	34+2	40	<3	84	18	55	15	6,9	yes
21	900477	17-02-2020	17-02-2020	34 days	female	AGA	29+3 wk	LSCS	940 gm	34+2	17	<3	16	18	14	10	7,9	yes
22	905631	25-02-2020	25-02-2020	46 days	famale	AGA	28+4 WK	LSCS	1090 gm	35+1	50	<3	33	23	27	<10	7,9	yes
23	909470	02-03-2020	02-03-2020	36 days	male	SGA	31+6 wk	LSCS	990 gm	37	<10	<3	12	38	22	11	5,8	yes
24	920166	23-03-2020	23-03-2020	37 days	female	AGA	28+4 wk	LSCS	1040 gm	33+6	42	<10	61	50	27	25	5,7	yes
25	921546	22-05-2020	22-05-2020	45 days	male	AGA	25+3 wk	VD	805 gm	32	56	12	74	40	69	42	6,7	yes
26	932492	06-06-2020	06-06-2020	30 days	female	AGA	28+ 4 wk	LSCS	1200 gm	33+1	67	21	33	28	27	10	7,8	yes
27	942648	25-07-2020	25-07-2020	39 days	male	AGA	27+5 wk	LSCS	1160 gm	33+3	71	<10	68	46	65	43	7,8	yes
28	943826	19-08-2020	19-08-2020	21 days	male	AGA	29+5 wk	LSCS	1060 gm	32+5	17	<10	30	25	37	28	7,8	yes
29	958653	24-08-2020	24-08-2020	15 days	male	AGA	31+1 wk	LSCS	1300 gm	33+2	19	<10	34	36	38	31	5,8	yes
30	959479	26-08-2020	26-08-2020	36 days	female	AGA	29+5 wk	VD	1200 gm	33+6	42	<10	32	50	27	31	5,8	yes
31	959876	28-08-2020	28-08-2020	35 days	female	SGA	34+6 wk	LSCS	1000 gm	39+6	<3	<3	<3	<3	3	3	6,9	yes
32	960353	28-08-2020	28-08-2020	14 days	male	AGA	31+2 wk	LSCS	1280 gm	33+2	16	14	12	5	21	14	5,7	yes
33	963792	08-09-2020	08-09-2020	61 days	male	AGA	26+4 wk	LSCS	860 gm	35+2	40	<3	100	22	33	<3	6,7	yes
34	963728	08-09-2020	08-09-2020	24 days	male	AGA	32 wk	LSCS	1200 gm	35+5	6	<3	17	16	21	17	8,9	yes
35	963729	08-09-2020	08-09-2020	28 days	female	SGA	32 wk	LSCS	1175 gm	36	8	<3	11	12	5	<10	8,9	yes
36	965099	12-09-2020	12-09-2020	29 days	female	AGA	30+5 wk	LSCS	1330 gm	34+6	38	<3	33	18	43	27	7,8	yes
37	965282	15-09-2020	15-09-2020	23 days	male	SGA	30+5 wk	LSCS	1145 gm	34	13	<3	<10	<10	<10	<10	6,8	yes
38	970581	29-09-2020	29-09-2020	25 days	male	SGA	30+6 WK	LSCS	860 gm	33+3	3	<3	18	<10	9	<3	6,8	yes
39	975487	13-10-2020	13-10-2020	10 days	female	AGA	28+6 wk	VD	1005 gm	30+2	32	14	27	16	68	43	6,7	yes
40	976765	16-10-2020	16-10-2020	41 days	female	SGA	32 wk	LSCS	1060 gm	37+6	5	<3	3	<3	20	<10	7,9	yes
41	977277	18-10-2020	18-10-2020	13 days	female	AGA	31 wk	LSCS	1465 gm	32+5	48	13	78	37	67	46	6,8	yes
42	977623	19-10-2020	19-10-2020	39 days	male	AGA	29+1 wk	LSCS	940 gm	34+5	20	<3	7	<3	18	<10	9,10	yes
43	979540	24-10-2020	24-10-2020	29 days	male	AGA	29+5 wk	LSCS	1340 gm	33+6	50	11	19	37	68	49	7,9	yes
44	979560	25-10-2020	25-10-2020	31 days	male	SGA	33+1 wk	LSCS	1010 gm	37+4	<3	<3	<3	<3	<3	<3	N/K	yes
45	984175	06-11-2020	06-11-2020	10 days	male	SGA	32+2 wk	VD	1240 gm	33+4	<10	<3	<10	<10	<10	<3	7,8	yes
46	984175	06-11-2020	06-11-2020	10 days	female	SGA	32+2 wk	VD	1180 gm	33+4	<10	<3	<3	<3	<3	<3	7,8	yes
47	985732	10-11-2020	10-11-2020	16 days	male	AGA	25+3 wk	LSCS	925 gm	27+5	84	50	19	<10	19	<3	6,8	yes
48	988532	18-11-2020	18-11-2020	28 days	male	LGA	29+6 wk	LSCS	1340 gm	33+6	47	<10	<10	<10	11	<10	8,9	yes
49	991920	26-11-2020	26-11-2020	11 days	male	AGA	25 wk	VD	720 gm	26+4	40	12	<3	<3	14	3	6,7	yes
50	983488	04-11-2020	04-11-2020	45 days	female	AGA	28+2 wk	LSCS	865 gm	34+5	15	<3	<3	<10	17	<10	6,7	yes
51	983996	06-11-2020	06-11-2020	52 days	female	AGA	28+2 wk	LSCS	1020 gm	35+5	44	<3	17	24	33	26	7,8	yes
52	985733	10-11-2020	10-11-2020	49 days	male	AGA	25+3 wk	LSCS	800 gm	32	55	<10	61	40	52	45	6,8	yes
53	988299	17-11-2020	17-11-2020	40 days	female	SGA	30+4 wk	VD	885 gm	36+2	6	<3	<3	<3	10	10	8,9	yes
54	988300	17-11-2020	17-11-2020	54 days	male	SGA	30+4 wk	VD	785 gm	38+2	3	<3	<10	13	<3	3	8,9	yes
55	989684	20-11-2020	20-11-2020	45 days	male	AGA	26+4 WK	VD	840 gm	33	36	<10	71	20	26	36	5,8	yes

		Reason For admission								Neonatal Morbidities										
S.No.	MRD	Respiratory symptoms	Respiratory Failure	Sepsis	Perinatal Asphyxia	Seizures	Hypoglycemia	Hyperbilirubinemia	Metabolic	Asphyxia needing BMV	Need for ventilation	Duration of Ventilator	RDS	Need for surfactant	AOP (Apnea Of Prematurity)	Feed Intolerance	Inotropes	CPAP	NEC	Phototherapy
1	846402	yes	yes	yes	not known	no	no	yes	no	not known	yes	10 days	yes	yes	yes	no	yes	yes	no	yes
2	854576	yes	yes	yes	yes	no	no	yes	no	yes	yes	7 days	yes	yes	yes	yes	yes	yes	no	yes
3	873175	yes	yes	no	no	no	no	yes	no	yes	yes	3 days	yes	no	no	no	no	yes	no	yes
4	873176	yes	no	no	no	no	no	yes	no	no	no	n/a	yes	yes	yes	no	no	yes	no	yes
5	873177	yes	no	no	no	no	yes	yes	no	no	no	n/a	yes	no	yes	no	no	yes	no	yes
6	873605	yes	yes	no	yes	no	no	yes	no	yes	yes	2 days	yes	no	no	no	no	yes	no	yes
7	873609	yes	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no
8	876438	yes	yes	yes	yes	no	yes	yes	no	yes	yes	3 days	yes	yes	yes	yes	yes	yes	no	yes
9	878192	yes	no	no	no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	yes	no	yes
10	880050	yes	no	yes	no	no	yes	yes	no	no	yes	5 days	no	no	yes	yes	yes	yes	yes	yes
11	880247	yes	yes	no	yes	no	no	no	no	yes	yes	2 days	yes	yes	no	no	no	yes	no	yes
12	879441	yes	no	no	no	no	no	yes	no	no	no	n/a	yes	no	yes	no	no	yes	no	yes
13	879443	yes	no		no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	yes	no	yes
14	884749	yes	yes	yes	yes	no	yes	yes	no	yes	yes	8 days	yes	yes	yes	yes	yes	yes	yes	yes
15	885298	yes	no	yes	no	no	no	yes	no	no	yes	6 days	yes	yes	yes	yes	no	yes	no	yes
16	886494	yes	no	no	no	no	no	yes	no	no	no	n/a	yes	yes	yes	yes	no	yes	no	yes
17	886215	yes	yes	yes	no	no	no	yes	no	no	yes	3 days	yes	yes	yes	yes	no	yes	no	yes
18	886216	yes	no	no	no	no	no	yes	no	no	no	n/a	yes	yes	yes	yes	no	yes	no	yes
19	887337	yes	no	no	no	no	no	yes	no	yes	no	n/a	yes	no	no	no	no	yes	no	yes
20	885204	yes	yes	yes	yes	no	yes	yes	no	yes	yes	2 days	yes	yes	yes	yes	yes	yes	no	yes
21	900477	yes	yes	yes	no	no	yes	yes	no	no	yes	2 days	yes	yes	yes	no	yes	yes	no	yes
22	905631	yes	yes	yes	no	no	yes	yes	no	no	yes	7 days	yes	yes	yes	yes	no	yes	no	yes
23	909470	yes	yes	yes	no	no	no	yes	no	no	yes	3 days	yes	yes	yes	yes	no	yes	yes	yes
24	920166	yes	yes	yes	yes	no	no	yes	no	yes	yes	7 days	yes	yes	yes	yes	no	yes	no	yes
25	921546	yes	yes	yes	yes	no	yes	yes	no	yes	yes	12 days	yes	yes	yes	yes	yes	yes	yes	yes
26	932492	yes	no	no	no	no	no	yes	no	no	no	n/a	no	no	no	no	no	yes	no	yes
27	942648	yes	no	no	no	no	no	yes	no	no	no	n/a	no	no	no	no	no	yes	no	yes
28	943826	yes	yes	no	no	no	no	yes	no	no	yes	5 days	yes	yes	yes	no	no	yes	no	yes
29	958653	yes	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no
30	959479	yes	no	yes	no	no	no	yes	no	no	no	n/a	no	no	no	no	no	yes	no	yes
31	959876	yes	no	yes	no	no	yes	yes	no	no	no	n/a	yes	yes	yes	no	no	yes	no	yes
32	960353	yes	no	yes	no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	yes	no	yes
33	963792	yes	yes	yes	yes	no	yes	yes	no	no	yes	14 days	yes	yes	yes	yes	yes	yes	no	yes
34	963728	yes	no	yes	no	no	yes	yes	no	no	no	n/a	yes	yes	no	yes	no	yes	yes	yes
35	963729	yes	no	yes	no	no	yes	no	no	no	no	n/a	yes	no	no	yes	no	yes	yes	yes
36	965099	yes	no	yes	no	no	yes	yes	no	no	no	n/a	yes	no	yes	yes	no	yes	yes	no
37	965282	yes	no	yes	no	no	no	yes	no	no	no	n/a	yes	no	yes	no	no	yes	no	yes
38	970581	yes	yes	yes	yes	no	yes	yes	no	yes	yes	10 days	yes	yes	yes	yes	yes	yes	no	no
39	975487	yes	yes	yes	yes	no	yes	yes	no	yes	yes	2 days	yes	yes	yes	no	yes	yes	no	yes
40	976765	yes	no	yes	no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	yes	no	yes
41	977277	yes	yes	yes	no	no	no	yes	no	yes	yes	2 days	yes	yes	no	no	no	yes	no	no
42	977623	yes	yes	yes	no	no	yes	yes	no	yes	yes	8 days	yes	yes	yes	yes	yes	yes	yes	yes
43	979540	yes	yes	yes	no	no	yes	yes	no	no	no	n/a	yes	no	yes	no	no	yes	no	yes
44	979560	yes	no	yes	no	no	no	yes	no	n/k	no	n/a	yes	yes	yes	no	no	yes	no	yes
45	984175	yes	yes	yes	no	no	no	yes	no	no	yes	2 days	yes	yes	yes	no	no	yes	yes	no
46	984175	yes	no	yes	no	no	no	no	no	no	no	n/a	yes	yes	yes	no	no	yes	no	no
47	985732	yes	yes	yes	yes	no	yes	yes	no	yes	yes	1 day	yes	yes	no	no	no	yes	no	yes
48	988532	yes	no	yes	no	no	no	no	no	no	no	n/a	yes	no	no	no	no	no	no	yes
49	991920	yes	yes	yes	yes	no	yes	yes	no	yes	yes	7 days	yes	yes	yes	no	yes	no	no	yes
50	983488	yes	yes	yes	yes	no	yes	yes	no	yes	yes	5 days	yes	yes	yes	no	no	yes	no	yes
51	983996	yes	no	yes	no	no	yes	no	no	no	no	n/a	yes	yes	yes	no	yes	no	yes	no
52	985733	yes	yes	yes	yes	no	no	yes	no	yes	yes	8 days	yes	yes	yes	yes	yes	yes	yes	yes
53	988299	yes	yes	yes	no	no	yes	yes	no	no	yes	6 days	yes	yes	yes	yes	yes	yes	yes	yes
54	988300	yes	yes	yes	no	no	yes	yes	no	no	yes	7 days	yes	yes	yes	yes	yes	yes	yes	no
55	989684	yes	yes	yes	yes	no	yes	yes	no	yes	yes	4 days	yes	yes	yes	no	yes	yes	no	yes

					Anthropometric Information						Day of			Daily	Daily	Daily	Daily	Daily					
S.No.	MRD	Exchange Transfusion	ROP	Sepsis	B.wt	Z - SCORE	Gestation wt.	NBS	LMP	EDD	minimum weight	Minimun weight	Daily weight gain D1	weight gain D2	weight gain D3	weight gain D4	weight gain D5	weight gain D6	Day7	Day 8	Day 9	Day 10	Day11
1	846402	no	yes	yes	800 gm	0.26	26 wk	27 week	08-05-2019	14-02-2020	2	730	800 gm	730 gm	not done	740 gm	not done	770 gm	835 gm	835 gm	880 gm	860 gm	840 gm
2	854576	no	yes	yes	800 gm	1.1	24+2 wk	26 wk	25-05-2019	29-02-2020	8	650	800 gm	740 gm	740 gm	660 gm	680 gm	700 gm	675 gm	650 gm	700 gm	720 gm	690 gm
3	873175	no	yes	no	1400 gm	-0.83	31+4 wk	33 wk	20-05-2019	24-02-2020	5	1195	1400 gm	1345 gm	1260 gm	1200 gm	1195 gm	1215 gm	1205 gm	1220 gm	1255 gm	1275 gm	1305 gm
4	873176	no	yes	yes	1130 gm	-1.29	31+4 wk	32 wk	20-05-2019	24-02-2020	5	1030	1110 gm	1110 gm	1000 gm	1020 gm	1030 gm	1040 gm	1060 gm	1080 gm	1095 gm	1110 gm	1160 gm
5	873177	no	yes	no	1140 gm	-1.51	31+4 wk	32 wk	20-05-2019	24-02-2019	6	1015	1140 gm	1100 gm	1110 gm	1170 gm	1030 gm	1015 gm	1035 gm	1045 gm	1065 gm	1085 gm	1100 gm
6	873605	no	yes	no	1430 gm	-0.9	31+6 wk	32 wk	17-05-2019	21-02-2020	5	1360	1410 gm	1360 gm	1370 gm	1400 gm	1360 gm	1370 gm	1375 gm	1385 gm	1385 gm	1395 gm	1400 gm
7	873609	no	yes	no	1470 gm	-0.79	31+6 wk	32 wk	17-05-2019	21-02-2020	4	1385	1455 gm	1390 gm	1390 gm	1385 gm	1405 gm	1350 gm	1390 gm	1390 gm	1410 gm	1410 gm	1430 gm
8	876438	no	yes	yes	1100 gm	0.1	28 wk	30 wk	15-06-2019	21-03-2020	12	905	1040gm	1000 gm	980 gm	990 gm	980 gm	960 gm	955 gm	970 gm	950 gm	883 gm	890 gm
9	878192	no	yes	no	1200 gm	-1.17	31+5 wk	32 wk	31-05-2019	06-03-2020	5	1005	1090 gm	1040 gm	1005 gm	1005 gm	1005 gm	1010 gm	1030 gm	1030 gm	1060 gm	1075 gm	1065 gm
10	880050	no	yes	yes	1160 gm	-2.05	32+6 wk	33 wk	25-05-2019	29-02-2019	9	1070	1110 gm	1175 gm	1155 gm	1085 gm	1080 gm	1105 gm	1100 gm	1090 gm	1070 gm	1090 gm	1125 gm
11	880247	no	yes	no	1180 gm	-1.6	32 wk	30 wk	03-06-2019	09-03-2020	13	1160	1200 gm	1170 gm	1165 gm	1195 gm	1220 gm	1225 gm	1220 gm	1225 gm	1210 gm	1210 gm	1210 gm
12	879441	no	yes	no	1275 gm	-0.6	30+3 wk	31 wk	11-06-2019	17-03-2020	3	1165	1210 gm	1165 gm	1165 gm	1180 gm	1200 gm	1175 gm	1190 gm	1225 gm	1220 gm	1190 gm	1205 gm
13	879443	no	yes	no	1300 gm	0.25	30+3 wk	32 wk	11-06-2019	17-03-2020	8	1130	1260 gm	1255 gm	1190 gm	1195 gm	1160 gm	1130 gm	1130 gm	1130 gm	1175 gm	1700 gm	1180 gm
14	884749	no	yes	yes	1095 gm	0.72	27+3 wk	28 wk	13-07-2019	18-04-2020	8	1135	1095 gm	1000 gm	940 gm	920 gm	960 gm	980 gm	990 gm	940 gm	920 gm	940 gm	950 gm
15	885298	no	yes	yes	1260 gm	0.14	29 wk	30 wk	07-06-2019	13-03-2020	3	1120	1185 gm	1135 gm	1120 gm	1150 gm	1165 gm	1160 gm	1150 gm	1135 gm	1145 gm	1150 gm	1160 gm
16	886494	no	yes	yes	1200 gm	-4.28	36+4 wk	34 wk	13-05-2019	17-02-2020	3	1110	1165 gm	1125 gm	1110 gm	1135 gm	1130 gm	1130 gm	1170 gm	1200 gm	1210 gm	1240 gm	1250 gm
17	886215	no	yes	yes	1160 gm	-0.32	29+1 wk	30 wk	25-06-2019	31-03-2020	5	895	990 gm	950 gm	935 gm	920 gm	895 gm	900 gm	915 gm	920 gm	935 gm	930 gm	960 gm
18	886216	no	yes	no	1130 gm	-0.43	29+1 wk	30 wk	25-06-2019	31-03-2020	6	1020	1090 gm	1075 gm	1065 gm	1020 gm	1025 gm	1020 gm	1035 gm	1030 gm	1045 gm	1050 gm	1060 gm
19	887337	no	no	no	1420 gm	-1.26	32+5 wk	32 WK	05-07-2019	10-04-2020	6	1240	1375 gm	1310 gm	1290 gm	1260 gm	1250 gm	1240 gm	1255 gm	1265 gm	1285 gm	1290 gm	1310 gm
20	885204	no	yes	yes	800 gm	-0.26	26 wk	28 wk	24-07-2019	29-04-2019	19	680	745 gm	745 gm	815 gm	750 gm	735 gm	745 gm	760 gm	765 gm	750 gm	760 gm	765 gm
21	900477	no	yes	yes	940 gm	-0.95	29+3 wk	28 wk	26-07-2019	01-05-2019	7	830	915 gm	875 gm	850 gm	855 gm	840 gm	850 gm	830 gm	850 gm	880 gm	910 gm	930 gm
22	905631	no	no	yes	1090 gm	-0.01	28+4 wk	28 wk	09-08-2019	15-05-2020	10	925	1060 gm	960 gm	965 gm	975 gm	960 gm	965 gm	950 gm	930 gm	925 gm	925 gm	970 gm
23	909470	no	yes	yes	990 gm	-2	31+6 WK	30 wk	23-07-2019	28-04-2020	1	895	895 gm	920 gm	940 gm	935 gm	950 gm	950 gm	970 gm	940 gm	1000 gm	1035 gm	1000 gm
24	920166	no	no	yes	1040 gm	-0.21	28+4 wk	28 wk	05-09-2019	11-06-2020	4	915	1000 gm	940 gm	920 gm	915 gm	935 gm	970 gm	990 gm	980 gm	940 gm	940 gm	920 gm
25	921546	no	no	no	805 gm	0.15	25+3 wk	26 wk	26-11-2019	01-09-2020	1	800	800 gm	780 gm	810 gm	805 gm	800 gm	810 gm	825 gm	845 gm	880 gm	910 gm	925 gm
26	932492	no	no	no	1200 gm	0.44	28+4 wk	30 wk	19-11-2019	25-08-2020	7	1075	1230 gm	1200 gm	1120 gm	1095 gm	1095 gm	1085 gm	1075 gm	1095 gm	1110 gm	1130 gm	1130 gm
27	942648	no	no	no	1160 gm	0.57	27+5 wk	28 wk	13-01-2020	19-10-2020	8	970	1130 gm	995 gm	995 gm	995 gm	945 gm	960 gm	980 gm	970 gm	980 gm	1000 gm	990 gm
28	943826	no	no	no	1060 gm	-0.94	29+5 wk	30 wk	24-01-2020	30-10-2020	5	990	1035 gm	1010 gm	980 gm	980 gm	990 gm	1010 gm	1030 gm	1030 gm	1040 gm	1050 gm	1100 gm
29	958653	no	no	no	1300 gm	-0.89	31+1 wk	32 wk	19-01-2020	25-10-2020	3	1210	1245 gm	1220 gm	1210 gm	1240 gm	1280 gm	1325 gm	1340 gm	1380 gm	1410 gm	1440 gm	1450 gm
30	959479	no	no	no	1200 gm	-0.2	29+5 wk	30 wk	31-01-2020	06-11-2020	14	1080	1225 gm	1220 gm	1100 gm	1080 gm	1060 gm	1090 gm	1100 gm	1110 gm	1110 gm	1085 gm	1095 gm
31	959876	no	no	no	1000 gm	-3.62	34+ 6 wk	32 wk	28-12-2019	03-10-2020	4	1075	980 gm	990 gm	1100 gm	1075 gm	1100 gm	1100 gm	1120 gm	1120 gm	1130 gm	1125 gm	1140 gm
32	960353	no	no	no	1280 gm	-1.01	31+2 wk	32 wk	22-01-2020	28-10-2020	2	1260	1270 gm	1260 gm	1300 gm	1310 gm	1300 gm	1350 gm	1395 gm	1480 gm	1540 gm	1560 gm	1600 gm
33	963792	no	no	yes	860 gm	-0.24	26+4 wk	26 wk	06-03-2020	11-12-2020	9	760	855 gm	835 gm	780 gm	830 gm	795 gm	760 gm	770 gm	780 gm	760 gm	770 gm	780 gm
34	963728	no	no	no	1200 gm	-1.55	32 wk	32 wk	28-01-2020	03-11-2020	6	970	1075 gm	1005 gm	1010 gm	980 gm	985 gm	970 gm	1000 gm	1030 gm	1065 gm	1110 gm	1150 gm
35	963729	no	no	no	1175 gm	-1.37	32 wk	32 wk	28-01-2020	03-11-2020	6	950	1065 gm	1020 gm	990 gm	990 gm	970 gm	950 gm	1000 gm	1020 gm	1030 gm	1060 gm	1100 gm
36	965099	yes	no	no	1330 gm	-0.3	30+5 wk	32 wk	10-02-2020	16-11-2020	5	1000	1200 gm	1045 gm	1020 gm	1010 gm	1000 gm	1005 gm	1010 gm	1035 gm	1075 gm	1095 gm	1090 gm
37	965282	no	no	no	1145 gm	-1.12	30+5 wk	30 wk	13-02-2020	19-11-2020	3	1070	1070 gm	1080 gm	1070 gm	1100 gm	1100 gm	1120 gm	1140 gm	1160 gm	1180 gm	1185 gm	1190 gm
38	970581	no	no	yes	860 gm	-1.93	30+6 wk	30 wk	26-02-2020	02-12-2020	1	830	830 gm	890 gm	900 gm	850 gm	910 gm	905 gm	890 gm	880 gm	875 gm	885 gm	880 gm
39	975487	no	no	yes	1005 gm	-0.48	28+6 wk	30 wk	25-03-2020	30-12-2020	5	875	985 gm	1030 gm	970 gm	930 gm	875 gm	885 gm	950 gm	1000 gm	970 gm		
40	976765	no	no	yes	1060 gm	-1.68	32 wk	32 wk	06-03-2020	13-12-2020	5	990	1080 gm	1030 gm	1010 gm	995 gm	990 gm	995 gm	1010 gm	1010 gm	1040 gm	1020 gm	1030 gm
41	977277	no	no	no	1465 gm	-0.05	31 wk	32 wk	14-02-2020	20-11-2020	7	1310	1460 gm	1400 gm	1380 gm	1370 gm	1315 gm	1315 gm	1310 gm	1340 gm	1355 gm	1370 gm	1410 gm
42	977623	no	no	yes	940 gm	-1.1	29+1 wk	30 wk	29-03-2020	03-01-2021	5	820	880 gm	870 gm	850 gm	835 gm	820 gm	830 gm	840 gm	855 gm	880 gm	880 gm	910 gm
43	979540	no	no	no	1340 gm	0	29+5 wk	30 wk	29-03-2020	03-01-2020	7	1225	1330 gm	1290 gm	1275 gm	1280 gm	1250 gm	1240 gm	1225 gm	1260 gm	1280 gm	1310 gm	1330 gm
44	979560	no	no	no	1010 gm	-2.53	33+1 wk	32 wk	07-03-2020	12-12-2020	10	915	975 gm	970 gm	960 gm	960 gm	965 gm	945 gm	935 gm	935 gm	930 gm	915 gm	930 gm
45	984175	no	no	no	1240 gm	-1.59	32+2 wk	32 wk	25-03-2020	30-12-2020	5	1025	1240 gm	1180 gm	1140 gm	1070 gm	1025 gm	1035 gm	1095 gm	1095 gm	1085 gm	1090 gm	
46	984175	no	no	no	1180 gm	-1.5	32+2 wk	32 wk	25-03-2020	30-12-2020	5	980	1145 gm	1055 gm	1035 gm	1010 gm	980 gm	1010 gm	1035 gm	1040 gm	1045 gm	1035 gm	
47	985732	no	no	yes	925 gm	1	25+3 wk	26 wk	16-05-2020	20-02-2021	6	690	790 gm	780 gm	710 gm	710 gm	715 gm	690 gm	710 gm	720 gm	750 gm	760 gm	830 gm
48	988532	no	no	no	1340 gm	-0.08	29+6 wk	30 wk	23-04-2020	28-01-2020	3	1175	1260 gm	1185 gm	1175 gm	1195 gm	1185 gm	1210 gm	1190 gm	1210 gm	1210 gm	1220 gm	1240 gm
49	991920	no	no	yes	720 gm	-0.16	25 wk	28 wk	04-06-2020	11-03-2020	2	605	625 gm	605 gm	625 gm	665 gm	695 gm	700 gm	690 gm	680 gm	690 gm		
50	983488	no	no	no	865 gm	-0.7	28+2 wk	28 wk	28-04-2020	25-01-2021	8	730	860 gm	800 gm	780 gm	750 gm	755 gm	745 gm	740 gm	730 gm	740 gm	750 gm	770 gm
51	983996	no	no	yes	1020 gm	-0.14	28+2 wk	28 wk	22-04-2020	27-01-2020	9	900	1015 gm	985 gm	995 gm	965 gm	960 gm	945 gm	920 gm	920 gm	900 gm	950 gm	940 gm
52	985733	no	no	yes	800 gm	0.12	25+3 wk	26 wk	16-05-2020	20-02-2021	13	720	895 gm	890 gm	800 gm	780 gm	785 gm	815 gm	810 gm	880 gm	860 gm	840 gm	770 gm
53	988299	no	no	yes	885 gm	-1.55	30+4 wk	30 wk	17-04-2020	22-01-2021	3	840	855 gm	840 gm	840 gm	850 gm	870 gm	870 gm	860 gm	900 gm	930 gm	945 gm	950 gm
54	988300	no	no	yes	785 gm	-2.02	30+4 wk	30 wk	17-04-2020	22-01-2021	2	740	780 gm	740 gm	750 gm	755 gm	750 gm	770 gm	780 gm	780 gm	830 gm	805 gm	815 gm
55	989684	no	no	no	840 gm	-0.35	26+4 wk	28 wk	18-05-2020	22-02-2021	5	780	870 gm	875 gm	795 gm	780 gm	780 gm	790 gm	820 gm	860 gm	870 gm	860 gm	860 gm

S.No.	MRD	Day 12	Day 13	Day 14	D 15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31	D32	D33	D34	D35	D36
1	846402	800 gm	780 gm	750 gm	760 gm	770 gm	750 gm	780 gm	800 gm	810 gm	800 gm	820 gm	820 gm	830 gm	850 gm	870 gm	895 gm	920 gm	960 gm	970 gm	985 gm	985 gm	995 gm	995 gm	1005 gm	1020 gm
2	854576	670 gm	890 gm	930 gm	940 gm	935 gm	970 gm	970 gm	1020 gm	1030 gm	1045 gm	1055 gm	1060 gm	1070 gm	1070 gm	1085 gm	1100 gm	1115 gm	1120 gm	1150 gm	1140 gm	1160 gm	1195 gm	1205 gm	1220 gm	1250 gm
3	873175	1340 gm	1360 gm	1360 gm	1370 gm																					
4	873176	1160 gm	1195 gm	1220 gm	1245 gm	1230 gm	1240 gm	1260 gm	1275 gm	1270 gm	1295 gm	1310 gm	1315 gm	1345 gm	1360 gm	1345 gm	1350 gm	1385 gm	1400 gm	1410 gm	1430 gm					
5	873177	1140 gm	1150 gm	1190 gm	1210 gm	1235 gm	1240 gm	1265 gm	1280 gm	1290 gm	1300 gm	1330 gm	1350 gm													
6	873605	1410 gm	1420 gm	1410 gm	1430 gm	1450 gm	1440 gm	1450 gm																		
7	873609	1450 gm	1465 gm	1460 gm	1470 gm	1460 gm	1480 gm	1490 gm																		
8	876438	905 gm	915 gm	980 gm	985 gm	1015 gm	1015 gm	1020 gm	1020 gm	1110 gm	1115 gm	1130 gm	1130 gm	1145 gm	1160 gm	1150 gm	1165 gm	1185 gm	1200 gm	1210 gm	1210 gm	1215 gm	1230 gm	1260 gm	1250 gm	1260 gm
9	878192	1095 gm	1115 gm	1115 gm	1120 gm	1125 gm	1170 gm	1190 gm	1195 gm	1280 gm	1280 gm															
10	880050	1140 gm	1180 gm	1220 gm	1240 gm	1225 gm	1270 gm	1340 gm	1350 gm	1370 gm	1390 gm															
11	880247	1190 gm	1160 gm	1220 gm	1220 gm	1200 gm	1240 gm	1250 gm	1265 gm	1280 gm	1310 gm	1320 gm														
12	879441	1205 gm	1230 gm	1240 gm	1240 gm	1300 gm	1280 gm	1300 gm																		
13	879443	1200 gm	1210 gm	1210 gm	1230 gm	1235 gm	1245 gm	1265 gm	1270 gm	1290 gm	1310 gm	1320 gm	1345 gm	1385 gm	1380 gm											
14	884749	955 gm	965 gm	1000 gm	1010 gm	1015 gm	1030 gm	1050 gm	1040 gm	1060 gm	1085 gm	1090 gm	1100 gm	1110 gm	1125 gm	1120 gm	1135 gm	1155 gm	1160 gm	1180 gm	1200 gm	1210 gm	1215 gm	1245 gm	1250 gm	1270 gm
15	885298	1145 gm	1185 gm	1190 gm	1210 gm	1240 gm	1255 gm	1280 gm	1275 gm	1270 gm	1300 gm	1315 gm	1320 gm	1345 gm	1350 gm	1360 gm										
16	886494	1280 gm	1310 gm	1340 gm	1320 gm	1310 gm	1350 gm	1385 gm																		
17	886215	955 gm	970 gm	1000 gm	1005 gm	990 gm	1010 gm	1035 gm	1055 gm	1085 gm	1100 gm	1110 gm	1115 gm	1130 gm	1140 gm	1145 gm	1160 gm	1175 gm	1185 gm	1180 gm	1195 gm	1210 gm	1240 gm	1250 gm	1285 gm	1300 gm
18	886216	1065 gm	1090 gm	1100 gm	1110 gm	1115 gm	1130 gm	1145 gm	1140 gm	1155 gm	1165 gm	1160 gm	1175 gm	1190 gm	1210 gm	1200 gm	1205 gm	1210 gm	1240 gm	1250 gm	1255 gm	1260 gm	1270 gm	1295 gm	1300 gm	1310 gm
19	887337	1320 gm	1315 gm	1345 gm	1380 gm	1370 gm	1390 gm	1395 gm																		
20	885204	775 gm	805 gm	790 gm	760 gm	740 gm	740 gm	700 gm	680 gm	700 gm	735 gm	750 gm	790 gm	800 gm	800 gm	800 gm	780 gm	780 gm	765 gm	800 gm	800 gm	835 gm	835 gm	830 gm	820 gm	850 gm
21	900477	940 gm	960 gm	980 gm	990 gm	1020 gm	1025 gm	1020 gm	1030 gm	1040 gm	1055 gm	1065 gm	1075 gm	1095 gm	1110 gm	1135 gm	1175 gm	1180 gm	1220 gm	1270 gm	1280 gm	1310 gm	1340 gm			
22	905631	970 gm	960 gm	970 gm	990 gm	1015 gm	985 gm	1010 gm	980 gm	1005 gm	1055 gm	1070 gm	1090 gm	1110 gm	1100 gm	1125 gm	1153 gm	1130 gm	1150 gm	1170 gm	1200 gm	1225 gm	1190 gm	1190 gm	1190 gm	1210 gm
23	909470	1075 gm	1100 gm	1080 gm	1095 gm	1120 gm	1125 gm	1140 gm	1155 gm	1175 gm	1170 gm	1170 gm	1150 gmm	1175 gm	1160 gm	1160 gm	1200 gm	1215 gm	1215 gm	1225 gm	1235 gm	1260 gm	1300 gm	1335 gm		
24	920166	925 gm	935 gm	940 gm	935 gm	970 gm	990 gm	1005 gm	1015 gm	1055 gm	1060 gm	1080 gm	1100 gm	1115 gm	1105 gm	1145 gm	1180 gm	1210 gm	1220 gm	1255 gm	1300 gm	1350 gm	1385 gm	1410 gm	1420 gm	1425 gm
25	921546	935 gm	950 gm	960 gm	980 gm	995 gm	1010 gm	1025 gm	1030 gm	1045 gm	1055 gm	1060 gm	1075 gm	1080 gm	1095 gm	1100 gm	1110 gm	1130 gm	1145 gm	1150 gm	1160 gm	1185 gm	1200 gm	1230 gm	1220 gm	1255 gm
26	932492	1130 gm	1130 gm	1140 gm	1180 gm	1230 gm	1235 gm	1260 gm	1320 gm	1320 gm	1350 gm	1405 gm	1445 gm	1405 gm	1415 gm	1510 gm	1540 gm	1610 gm	1615 gm							
27	942648	1015 gm	1035 gm	1050 gm	1045 gm	1065 gm	1050 gm	1085 gm	1050 gm	1080 gm	1110 gm	1160 gm	1140 gm	1150 gm	1165 gm	1170 gm	1160 gm	1175 gm	1200 gm	1230 gm	1240 gm	1260 gm	1270 gm	1260 gm	1325 gm	1340 gm
28	943826	1125 gm	1140 gm	1150 gm	1145 gm	1175 gm	1195 gm	1215 gm	1250 gm																	
29	958653	1465 gm	1480 gm	1520 gm																						
30	959479	1085 gm	1095 gm	1080 gm	1080 gm	1100 gm	1110 gm	1115 gm	1125 gm	1130 gm	1160 gm	1155 gm	1175 gm	1200 gm	1210 gm	1215 gm	1230 gm	1255 gm	1265 gm	1260 gm	1275 gm	1290 gm	1310 gm	1340 gm	1360 gm	
31	959876	1160 gm	1150 gm	1145 gm	1170 gm	1180 gm	1195 gm	1165 gm	1200 gm	1215 gm	1225 gm	1230 gm	1245 gm	1265 gm	1250 gm	1255 gm	1275 gm	1300 gm	1315 gm	1325 gm	1340 gm	1350 gm	1360 gm	1365 gm		
32	960353	1615 gm	1625 gm	1645 gm	1655 gm																					
33	963792	780 gm	810 gm	790 gm	800 gm	800 gm	785 gm	790 gm	800 gm	810 gm	830 gm	870 gm	900 gm	930 gm	940 gm	935 gm	970 gm	975 gm	1000 gm	1035 gm	1060 gm	1080 gm	1115 gm	1115 gm	1110 gm	1140 gm
34	963728	1120 gm	1145 gm	1155 gm	1180 gm	1190 gm	1215 gm	1220 gm	1240 gm	1260 gm	1290 gm	1310 gm	1320 gm													
35	963729	1130 gm	1120 gm	1140 gm	1150 gm	1175 gm	1190 gm	1210 gm	1225 gm	1240 gm	1260 gm	1280 gm	1310 gm	1330 gm	1375 gm	11390 gm	1410 gm									
36	965099	1110 gm	1160 gm	1150 gm	1210 gm	1240 gm	1245 gm	1255 gm	1275 gm	1280 gm	1295 gm	1300 gm	1315 gm	1320 gm	1340 gm	1345 gm	1350 gm	1355 gm								
37	965282	1210 gm	1200 gm	1215 gm	1235 gm	1260 gm	1285 gm	1275 gm	1300 gm	1340 gm	1350 gm	1365 gm														
38	970581	875 gm	885 gm	880 gm	890 gm	920 gm	950 gm	990 gm	990 gm	1025 gm	1065 gm	1165 gm	1190 gm	1200 gm												
39	975487																									
40	976765	1040 gm	1040 gm	1040 gm	1050 gm	1050 gm	1075 gm	1075 gm	1065 gm	1070 gm	1085 gm	1105 gm	1100 gm	1105 gm	1120 gm	1135 gm	1140 gm	1155 gm	1180 gm	1190 gm	1175 gm	1200 gm	1215 gm	1230 gm	1240 gm	1250 gm
41	977277	1410 gm																								
42	977623	900 gm	885 gm	890 gm	910 gm	950 gm	960 gm	965 gm	975 gm	990 gm	990 gm	1005 gm	1005 gm	1015 gm	1015 gm	1025 gm	1045 gm	1055 gm	1055 gm	1125 gm	1140 gm	1160 gm	1190 gm	1230 gm	1250 gm	1290 gm
43	979540	1340 gm	1350 gm	1380 gm	1400 gm	1440 gm	1450 gm	1450 gm	1505 gm	1495 gm	1505 gm	1540 gm	1530 gm	1640 gm	1660 gm	1675 gm	1695 gm	1710 gm								
44	979560	965 gm	990 gm	1020 gm	1020 gm	1090 gm	1090 gm	1095 gm	1150 gm	1185 gm	1190 gm	1220 gm	1195 gm	1220 gm	1195 gm	1240 gm	1280 gm	1280 gm	1300 gm	1360 gm	1420 gm					
45	984175																									
46	984175																									
47	985732	850 gm	1040 gm	1000 gm																						
48	988532	1255 gm	1280 gm	1290 gm	1325 gm	1315 gm	1320 gm	1340 gm	1370 gm	1405 gm	1435 gm	1465 gm	1430 gm	1515 gm	1540 gm	1590 gm										
49	991920																									
50	983488	795 gm	810 gm	840 gm	855 gm	840 gm	880 gm	885 gm	895 gm	920 gm	945 gm	985 gm	1000 gm	1005 gm	1035 gm	1050 gm	1080 gm	1080 gm	1125 gm	1180 gm	1180 gm	1185 gm	1190 gm	1200 gm	1235 gm	1280 gm
51	983996	940 gm	970 gm	1010 gm	1020 gm	1040 gm	1040 gm	1080 gm	1080 gm	1085 gm	1075 gm	1085 gm	1100 gm	1110 gm	1115 gm	1170 gm	1210 gm	1200 gm	1240 gm	1270 gm	1310 gm	1335 gm	1350 gm	1420 gm	1345 gm	1325 gm
52	985733	770 gm	720 gm	760 gm	755 gm	770 gm	785 gm	800 gm	810 gm	820 gm	830 gm	850 gm	870 gm	870 gm	885 gm	920 gm	930 gm	940 gm	950 gm	955 gm	980 gm	1000 gm	1020 gm	1045 gm	1070 gm	1085 gm
53	988299	935 gm	915 gm	960 gm	990 gm	1035 gm	1075 gm	1090 gm	1100 gm	1125 gm	1120 gm	1115 gm	1120 gm	1115 gm	1120 gm	1120 gm	1130 gm	1115 gm	1135 gm	1145 gm	1155 gm	1175 gm	1200 gm	1215 gm	1215 gm	1230 gm
54	988300	815 gm	800 gm	810 gm	835 gm	845 gm	840 gm	875 gm	880 gm	900 gm	890 gm	905 gm	890 gm	860 gm	870 gm	890 gm	900 gm	880 gm	930 gm	920 gm	925 gm	945 gm	955 gm	975 gm	1000 gm	1020 gm
55	989684	850 gm	860 gm	830 gm	810 gm	815 gm	815 gm	850 gm	880 gm	900 gm	915 gm	940 gm	965 gm	985 gm	995 gm	1010 gm	1040 gm	1060 gm	1050 gm	1090 gm	1090 gm	1095 gm	1095 gm	1080 gm	1100 gm	1135 gm

S.No.	MRD	D37	D38	D39	D40	D41	D42	D43	D44	D45	D46	D47	D48	D49	D50	D51	D52	D53	D54	D55	D56	D57	D58	D59	D60	D61
1	846402	1040 gm	1040 gm	1060 gm	1080 gm	1080 gm	1070 gm	1070 gm	1090 gm	1040 gm	1045 gm	1055 gm	1085 gm	1125 gm	1165 gm	1195 gm	1220 gm	1260 gm	1290 gm	1340 gm	1400 gm	1420 gm	1440 gm	1480 gm	1530 gm	1515 gm
2	854576	1265 gm	1290 gm	1310 gm	1340 gm	1350 gm	1365 gm	1395 gm	1400 gm	1410 gm																
3	873175																									
4	873176																									
5	873177																									
6	873605																									
7	873609																									
8	876438	1250 gm	12690 gm	1270 gm	1310 gm																					
9	878192																									
10	880050																									
11	880247																									
12	879441																									
13	879443																									
14	884749	1265 gm	1285 gm	1280 gm	1290 gm	1310 gm	1325 gm	1350 gm																		
15	885298																									
16	886494																									
17	886215																									
18	886216	1340 gm	1350 gm	1355 gm																						
19	887337																									
20	885204	880 gm	905 gm	940 gm	960 gm	975 gm	985 gm	990 gm	1010 gm	1025 gm	1035 gm	1050 gm	1055 gm	1065 gm	1070 gm	1085 gm	1090 gm	1100 gm	1130 gm	1150 gm	1160 gm	1175 gm	1185 gm	1210 gm	1250 gm	1270 gm
21	900477																									
22	905631	1230 gm	1245 gm	1250 gm	1275 gm	1285 gm	1310 gm	1320 gm	1350 gm	1355 gm																
23	909470																									
24	920166																									
25	921546	1285 gm	1290 gm	1300 gm	1310 gm	1305 gm	1340 gm	1350 gm																		
26	932492																									
27	942648	1340 gm	1360 gm	1410 gm																						
28	943826																									
29	958653																									
30	959479																									
31	959876																									
32	960353																									
33	963792	1140 gm	1165 gm	1160 gm	1155 gm	1160 gm	1165 gm	1180 gm	1220 gm	1230 gn	1250 gm	1280 gm	1300 gm	1325 gm	1355 gm	1380 gm	1410 gm	1410 gm	1435 gm	1465 gm	1500 gm	1540 gm	1550 gm	1550 gm	1560 gm	
34	963728																									
35	963729																									
36	965099																									
37	965282																									
38	970581																									
39	975487																									
40	976765	1265 gm	1285 gm	1300 gm	1340 gm																					
41	977277																									
42	977623	1340 gm																								
43	979540																									
44	979560																									
45	984175																									
46	984175																									
47	985732																									
48	988532																									
49	991920																									
50	983488	1310 gm	1350 gm	1370 gm	1410 gm	1420 gm	1450 gm	1490 gm	1490 gm	1500 gm																
51	983996	1295 gm	1265 gm	1280 gm	1270 gm	1250 gm	1310 gm	1340 gm	1290 gm	1295 gm	1300 gm	1320 gm	1355 gm	1370 gm	1400 gm											
52	985733	1120 gm	1120 gm	1150 gm	1170 gm	1195 gm	1195 gm	1210 gm	1220 gm	1250 gm	1253 gm	1290 gm														
53	988299	1260 gm	1300 gm	1325 gm	1350 gm	1365 gm	1395 gm																			
54	988300	1025 gm	1030 gm	1053 gm	1085 gm	1100 gm	1125 gm	1140 gm	1145 gm	1160 gm	1175 gm	1200 gm	1215 gm	1230 gm	1250 gm	1260 gm	1300 gm									
55	989684	1160 gm	1190 gm	1200 gm	1230 gm	1250 gm	1300 gm	1310 gm																		

S.No.	MRD	D62	D63	D64	D65	D66	D67	D68	D69	Z - SCORE	HC AT ADM	Z - SCORE	HC WEEK1	HC WEEK2	HC WEEK 3	HC WEEK4	HC WEEK 5	HC WEEK6	HC WEEK 7	HC WEEK 8	HC WEEK 9	HC WEEK 10	HC WEEK 11
1	846402	1525 gm	1550 gm	1575 gm	1635 gm	1690 gm	1700 gm	1730 gm		-2.52	24 cm	0.23	24.5 cm	25 cm	25.5 cm	26cm	27 cm	28 cm	29 cm	30 cm	30.5 cm	31 cm	
2	854576									-0.34	21 cm	-0.81	21.5 cm	22.5 cm	23 cm	24 cm	25 cm	26 cm	27 cm				
3	873175									-1.98	29 cm	0	29 cm	29.5 cm									
4	873176									-3.28	27 cm	-1	27 cm	27.5 cm	28 cm	29 cm	29.5 cm						
5	873177									-2.64	28 cm	-0.67	28.5 cm	29 cm	30 cm								
6	873605									-2.32	28 cm	-0.85	29 cm	29.5 cm	30 cm								
7	873609									-2.15	27 cm	-1.53	28 cm	29 cm	29.5 cm								
8	876438									-1.9	25 cm	-0.45	25 cm	25.5 cm	26 cm	27 cm	27.8 cm						
9	878192									-2.75	27.5 cm	-0.72	28 cm	28 cm	29 cm								
10	880050									-3.21	28 cm	-1.44	29 cm	30 cm	31 cm								
11	880247									-2.96	27 cm	-1.61	27.5 cm	28 cm	29 cm								
12	879441									-1.93	27 cm	-0.64	27.5 cm	28 cm	28.5 cm								
13	879443									-2	28 cm	0.45	28.5 cm	29 cm	29 cm	30 cm							
14	884749									-1.82	25.8 cm	0.93	26 cm	26.5 cm	27 cm	28 cm	29 cm	29.5 cm					
15	885298									-1.57	26.5 cm	-0.06	27 cm	27 cm	27.5 cm	28 cm							
16	886494									-5.26	28 cm	-3.19	28 cm	29 cm	29.5 cm								
17	886215									-2.52	27 cm	0.2	27 cm	27.5 cm	28 cm	29 cm							
18	886216									-2.63	26.5 cm	-0.16	27 cm	27 cm	28.5 cm	29 cm	30 cm						
19	887337									-1.77	27 cm	-2.03	27.5 cm	28 cm									
20	885204	1300 gm	1320 gm	1360 gm						-2.3	25 cm	0.98	25.5 cm	26 cm	26 cm	27 cm	28 cm	28.5 cm	29 cm	29.5 cm	30 cm		
21	900477									-2.2	25.5 cm	-0.99	25.5 cm	26.5 cm	27 cm	28 cm	29.5 cm						
22	905631									-2.72	25 cm	-0.43	26 cm	27.5 cm	28 cm	29 cm	30 cm	30.5 cm					
23	909470									-3.96	27 cm	-1.53	28 cm	29 cm	30 cm	31 cm	31.5 cm						
24	920166									-1.71	26 cm	0.28	27 cm	28 cm	29 cm	30 cm	30.5 cm						
25	921546									-1.18	24 cm	0.65	25 cm	26 cm	27 cm	28 cm	28.5 cm	29 cm					
26	932492									-0.8	25 cm	-0.43	26 cm	27 cm	28 cm	29 cm							
27	942648									-1.74	26 cm	0.46	27 cm	28 cm	29 cm	29.5 cm	30 cm	30.5 cm					
28	943826									-1.77	26.5 cm	-0.53	27 cm	28 cm	29 cm								
29	958653									-1.4	28 cm	-0.41	29 cm	30 cm									
30	959479									-1.88	27 cm	-0.47	27 cm	28 cm	29 cm	30 cm	30.5 cm						
31	959876									-5.72	28 cm	-2.22	29 cm	30 cm	30.5 cm	31 cm	31 cm						
32	960353									-1.07	27 cm	-1.18	27.5 cm	28 cm									
33	963792									-2.38	25 cm	0.55	26 cm	27 cm	27.5 cm	28 cm	28 cm	29 cm	30 cm	30.5 cm	31 cm		
34	963728									-3.22	28 cm	-0.94	29 cm	30 cm	31 cm	31 m							
35	963729									-0.44	27 cm	-1.24	28 cm	29 cm	30 cm	30.5 cm							
36	965099									-2.53	27.5 cm	-0.43	28 cm	29 cm	29.5 cm	30 cm							
37	965282									-2.14	26 cm	-1.51	27 cm	28 cm	29 cm								
38	970581									-2.23	27 cm	-0.91	27.5 cm	27.5 cm	28 cm								
39	975487									-1.19	25 cm	-0.62	25.5 cm										
40	976765									-4.67	26 cm	-1.92	26.5 cm	27 cm	27.5 cm	28 cm	29 cm	30.5 cm					
41	977277									-1.11	29 cm	0.76	29 cm	30 cm	30 cm								
42	977623									-2.59	24 cm	-1.91	25 cm	26 cm	27 cm	28 cm	28.5 cm						
43	979540									-1.24	26 cm	-0.8	27 cm	28 cm	29 cm	30.5 cm							
44	979560									-3.73	26 cm	-2.95	26.5 cm	27 cm	27.5 cm	28.5 cm							
45	984175									-2.55	27.5 cm	-1.44	28.5 cm										
46	984175									-2.61	25 cm	-2.77	25.5 cm										
47	985732									0	22 cm	-0.88	23 cm	23 cm									
48	988532									-1.27	25.5 cm	-1.31	27 cm	28 cm	28 cm	29 cm							
49	991920									-1.16	19 cm	-2.89	20 cm										
50	983488									-2.02	23 cm	-1.68	24 cm	25 cm	26.5 cm	27 cm	28 cm	29 cm					
51	983996									-2.98	24 cm	-0.96	25 cm	25 cm	27 cm	28 cm	29.5 cm	30 cm	31 cm				
52	985733									-1.33	23.5 cm	0.27	23.5 cm	24 cm	25 cm	26 cm	27 cm	28 cm	29 cm				
53	988299									-3.39	24 cm	-2.4	25 cm	26 cm	27 cm	28 cm	29 cm	29.5 cm					
54	988300									-4.87	25 cm	-2.1	26 cm	27.5 cm	29 cm	30 cm	31 cm	32 cm	32.5 cm				
55	989684									-1.76	25 cm	0.55	26 cm	27 cm	28 cm	28.5 cm	29 cm	29 cm					

S.No.	MRD	Z- SCORE	LENGTH AT ADM.	Z - SCORE	LENGTH W1	LENGTH W2	LENGTH WK 3	LENGTH WK 4	LENGTH W5	LENGTH W 6	LENGTH W 7	LENGTH W8	LENGTH W9	LENGTH W 10	LENGTH W11	Z - SCORE	OUTCOME
1	846402	-3.27	31 cm	-1.21	32 cm	33 cm	34.5 cm	36 cm	36.5 cm	37 cm	38 cm	39.5 cm	41 cm	42 cm		-2.67	SHIFTED
2	854576	-0.82	30 cm	-0.66	31.5 cm	32 cm	34 cm	35 cm	36 cm	37 cm	38.5 cm					-0.67	SHIFTED
3	873175	-0.93	39 cm	-0.95	40 cm	41.5 cm										-1.13	SHIFTED
4	873176	-2.26	36 cm	-1.82	37 cm	38.5 cm	39 cm	40.5 cm	41 cm							-2.67	SHIFTED
5	873177	-1.21	38 cm	-1.34	39 cm	40.5 cm	42 cm									-1.53	SHIFTED
6	873605	-1.14	35 cm	-2.69	36 cm	37.5 cm	39 cm									-2.66	SHIFTED
7	873609	-1.06	35 cm	-2.69	36 cm	37.5 cm	39 cm									-2.58	SHIFTED
8	876438	-1.83	35 cm	-0.6	35.5 cm	37 cm	37.5 cm	38 cm	38.5 cm							-1.89	SHIFTED
9	878192	-1.59	39 cm	-0.7	40 cm	41.5 cm	43 cm									-0.8	SHIFTED
10	880050	-1.12	38 cm	-2.05	39.5 cm	40 cm	41.5 cm									-2.32	SHIFTED
11	880247	-2.11	36 cm	-2.37	37 cm	38 cm	38.5 cm									-1.75	SHIFTED
12	879441	-1.36	37 cm	-1.11	38 cm	39 cm	40 cm									-1.49	SHIFTED
13	879443	-0.51	40 cm	0.37	41 cm	42 cm	43 cm	43 cm								-0.45	SHIFTED
14	884749	-0.6	38 cm	1.34	39 cm	39.5 cm	40 cm	41 cm	41 cm	42 cm						-0.61	SHIFTED
15	885298	-1.44	37 cm	-0.33	38 cm	39 cm	40 cm	40 cm								-1.26	SHIFTED
16	886494	-3.39	37 cm	-4	38 cm	39 cm	41 cm									-3.71	SHIFTED
17	886215	-1.66	38 cm	-0.01	38 cm	39 cm	40 cm	40.5 cm								-1.51	SHIFTED
18	886216	-1.21	38 cm	-0.01	39 cm	40 cm	41.5 cm	43 cm	43 cm							-1.13	SHIFTED
19	887337	-1.77	39 cm	-1.58	39.5 cm	40 cm										-1.57	SHIFTED
20	885204	-0.91	34 cm	0.13	34.5 cm	35.5 cm	37 cm	38 cm	39.5 cm	39.5 cm	41 cm	42 cm	42.5 cm			-1.03	SHIFTED
21	900477	-0.93	37 cm	-1.06	37 cm	38 cm	39 cm	40 cm	41 cm							-1.27	SHIFTED
22	905631	-0.74	36 cm	-0.6	36.5 cm	37 cm	38 cm	39 cm	40 cm	41.5 cm						-1.51	SHIFTED
23	909470	-0.56	39 cm	-1.11	40 cm	41.5 cm	43 cm	44 cm	44.5 cm							-1.57	SHIFTED
24	920166	-0.01	35 cm	-0.6	36 cm	38 cm	39.5 cm	41 cm	42 cm							-0.68	SHIFTED
25	921546	-0.26	34 cm	0.5	35 cm	37 cm	38 cm	39 cm	39.5 cm	40.5 cm						-0.2	SHIFTED
26	932492	-0.6	35 cm	-0.6	36 cm	37 cm	38 cm	39.5 cm								-1.26	SHIFTED
27	942648	-0.43	37 cm	0.4	38.5 cm	40 cm	41 cm	42 cm	43 cm	43.5 cm						-0.18	SHIFTED
28	943826	-0.69	38 cm	-0.32	39 cm	40 cm	41.5 cm									-0.59	SHIFTED
29	958653	-0.35	40 cm	-0.32	41 cm	42.5 cm										-0.5	SHIFTED
30	959479	-0.01	36.5 cm	-0.61	37.5 cm	39 cm	40 cm	41 cm	42.5 cm							-0.49	SHIFTED
31	959876	-2.63	40 cm	-1.94	41 cm	42 cm	43.5 cm	45 cm	46 cm							-1.89	SHIFTED
32	960353	-1.69	39 cm	-0.79	40 cm	41 cm										-1.1	SHIFTED
33	963792	-0.76	33.5 cm	-0.43	34.5 cm	36.5 cm	38 cm	39 cm	40 cm	41 cm	42 cm	43.5 cm	45 cm			-0.54	SHIFTED
34	963728	-0.98	40 cm	-0.79	41 cm	42.5 cm	43 cm	44.5 cm								-0.96	SHIFTED
35	963729	-1.19	37 cm	-1.61	38 cm	39 cm	41 cm	42.5 cm								-1.55	SHIFTED
36	965099	-0.92	39 cm	-0.17	41 cm	42 cm	43 cm	43.5 cm								-0.61	SHIFTED
37	965282	-1.42	36 cm	-1.67	37.5 cm	39 cm	41 cm									-1.48	SHIFTED
38	970581	-1.72	37 cm	-1.35	37 cm	38 cm	38 cm									-2.36	EXPIRED
39	975487	-1.19	38 cm	0.46	38 cm											0.33	DAMA
40	976765	-2.09	39 cm	-0.85	39 cm	41 cm	42.5 cm	43 cm	43.5 cm	45 cm						-1.41	SHIFTED
41	977277	-0.33	41 cm	0.44	41.5 cm	45 cm										-0.1	SHIFTED
42	977623	-2.14	35 cm	-1.22	36 cm	38 cm	39 cm	40 cm	41 cm							-1.86	SHIFTED
43	979540	-0.34	40 cm	0.48	41 cm	43 cm	44 cm	44.5 cm								-0.01	SHIFTED
44	979560	-3.27	37 cm	-2.6	38 cm	39.5 cm	41 cm	41 cm								-3.03	SHIFTED
45	984175	-1.52	38 cm	-1.74	39 cm											-2.04	DAMA
46	984175	-3.2	36 cm	-2.13	37 cm											-2.42	DAMA
47	985732	-1.7	31 cm	-0.88	31.5 cm	31.5 cm										-1.91	EXPIRED
48	988532	-1.34	36 cm	-1.2	37 cm	38 cm	39.5 cm	41 cm								-1.4	SHIFTED
49	991920	-3.16	30 cm	-1.1	30 cm											-1.96	EXPIRED
50	983488	-1.51	34.5 cm	-0.66	36 cm	38 cm	39.5 cm	40 cm	41 cm	42 cm						-1.11	SHIFTED
51	983996	-1.72	35 cm	-0.45	35 cm	35.5 cm	37 cm	39 cm	41 cm	43 cm	44.5 cm					-0.63	SHIFTED
52	985733	-0.26	33 cm	0.04	34 cm	36 cm	38 cm	39.5 cm	41 cm	42.5 cm	43 cm					0.39	SHIFTED
53	988299	-2.02	36 cm	-1.26	37 cm	39 cm	40.5 cm	41 cm	42 cm	43.5 cm						-1.29	SHIFTED
54	988300	-1.11	34 cm	-2.39	35.5 cm	37 cm	38.5 cm	41 cm	43 cm	44 cm	45 cm					-1.95	SHIFTED
55	989684	-0.86	33 cm	-0.65	35 cm	37.5 cm	39 cm	40 cm	41 cm	42.5 cm						-0.35	SHIFTED

S.No.	MRD	DOB	DOA	Duration of hospital stay	Gender	Growth (AGA/SGA/LGA)	Gestation at birth	Mode of Delivery (VD/VD Assisted/LSCS)	Birth Weight	gestation at shifting	birth wt centile	wt centile at shifting	HC centile at birth	HC centile at shifting	length centile at birth	length centile at shifting	APGAR (1,5 min)	Prematurity
56	999307	12-12-2020	12-12-2020	55 days	female	AGA	26+5 wk	LSCS	830 gm	34+4	42	<3	80	47	51	39	6,8	yes
57	1001516	17-12-2020	17-12-2020	23 days	male	AGA	29+4 wk	LSCS	1380 gm	32+6	39	<10	90	46	15	19	6,8	yes
58	1001517	17-12-2020	17-12-2020	26 days	male	AGA	29+4 wk	LSCS	1220 gm	33+2	37	<10	90	36	15	38	5,7	yes
59	1001877	18-12-2020	18-12-2020	38 days	female	AGA	29+3 wk	LSCS	1030 gm	34+6	26	<10	39	40	40	41	7,9	yes
60	1003240	22-12-2020	22-12-2020	43 days	male	AGA	30+1 wk	LSCS	1000 gm	36+2	10	<3	32	28	17	15	6,9	yes
61	1004900	25-12-2020	25-12-2020	34 days	male	SGA	31+ 1 wk	LSCS	1040 gm	36	6	<3	34	33	7	10	8,9	yes
62	1006494	30-12-2020	30-12-2020	43 days	male	SGA	29+3 wk	LSCS	860 gm	35+4	7	<3	<10	18	<10	<3	5,7	yes
63	1014058	18-01-2021	18-01-2021	32 days	male	AGA	31+6 wk	LSCS	1200 gm	35+3	<10	<3	20	20	30	21	6,8	yes
64	1016347	22-01-2021	22-01-2021	26 days	female	SGA	33+4 wk	LSCS	1380 gm	37+2	3	<3	80	36	<10	10	5,8	yes
65	1014916	20-01-2021	20-01-2021	50 days	male	AGA	27+6 wk	VD	1150 gm	35	66	<3	77	27	77	27	6,8	yes
66	1019279	29-01-2021	29-01-2021	28 days	female	AGA	26+1 wk	VD	780 gm	30+1	44	10	70	14	81	15	6,7	yes
67	1020325	31-01-2021	31-01-2021	38 days	male	LGA	28 WK	LSCS	1230 gm	33+3	76	22	84	89	97	54	8,9	yes
68	1020986	02-02-2021	02-02-2021	54 days	male	AGA	27 wk	LSCS	930 gm	34+5	45	<3	60	<10	90	15	5,8	Yes
69	1023020	05-02-2021	05-02-2021	31 days	female	SGA	25+4 wk	LSCS	560 gm	30	<10	<3	<10	<3	13	<3	5,7	yes
70	1051590	05-03-2021	05-03-2021	16 days	male	SGA	32+6 wk	LSCS	1200 gm	35+1	3	<3	<3	<3	<3	<3	6,9	yes
71	900698	22-02-2020	22-02-2020	46 days	male	AGA	28+1 wk	LSCS	1220 gm	34+5	71	<3	29	<3	56	<10	7,9	yes
72	910155	26-02-2020	26-02-2020	16 days	female	SGA	32+4 wk	LSCS	1260 gm	35	<10	<3	<10	<10	35	14	7,9	yes
73	909463	04-03-2020	04-03-2020	23 days	female	AGA	30+3 wk	LSCS	1420 gm	33+5	55	13	87	40	94	56	5,9	yes
74	909464	04-03-2020	04-03-2020	43 days	female	SGA	30+3 wk	LSCS	960 gm	36+4	10	<3	18	3	12	<3	7,9	yes
75	964512	10-09-2020	10-09-2020	12 days	female	AGA	29+4 wk	VD	980 gm	31+2	19	<10	<10	<3	23	<10	7,8	yes
76	1030055	18-02-2021	18-02-2021	61 days	male	AGA	26 wks	LSCS	890 gm	34+5	62	<3	59	<10	93	<10	1,5,7	yes
77	1032798	22-02-2021	22-02-2021	44 days	male	AGA	29+6 wk	LSCS	1080 gm	36+1	17	<3	27	3	<3	<3	7,9	yes
78	1050916	13-03-2021	13-03-2021	52 days	male	AGA	27 wk	LSCS	1120 gm	34+3	82	13	84	16	80	10	7,9	yes
79	1052416	15-03-2021	15-03-2021	40 days	female	AGA	27+5 wk	LSCS	960 gm	33+3	46	<10	56	<10	45	<3	5,8	yes
80	1055316	17-03-2021	17-03-2021	36 days	female	AGA	28+6 wk	LSCS	1000 gm	34	31	<3	54	33	52	17	6,8	yes
81	1055469	18-03-2021	18-03-2021	34 days	female	AGA	29+4 wk	LSCS	1250 gm	34+3	52	<10	35	<10	68	12	8,10	yes
82	1055470	18-03-2021	18-03-2021	33 days	male	AGA	29+4 wk	LSCS	1370 gm	34+2	58	<10	95	40	71	26	6,8	yes
83	1055471	18-03-2021	18-03-2021	35 days	female	AGA	29+4 wk	LSCS	1135 gm	34+4	36	<3	14	10	52	15	6,8	yes
84	1077138	05-04-2021	05-04-2021	47 days	male	AGA	30+5 wk	LSCS	1375 gm	37+3	33	<3	71	23	32	<10	5,8	yes
85	1077938	06-04-2021	06-04-2021	42 days	male	AGA	27+2 wk	LSCS	980 gm	33+2	50	<10	37	<3	59	<3	8,9	yes
86	1077941	06-04-2021	06-04-2021	18 days	female	AGA	27+2 wk	LSCS	795 gm	29+6	25	<10	67	10	89	14	7,9	yes
87	1089499	18-04-2021	18-04-2021	49 days	female	AGA	27 wk	LSCS	960 gm	34	63	<3	32	<10	28	<3	7,8	yes
88	1090261	19-04-2021	19-042021	32 days	male	LGA	29+3 wk	LSCS	1400 gm	34	66	<10	76	<10	93	39	7,8	yes
89	1101098	02-05-2021	02-05-2021	31 days	male	AGA	28+4 wk	LSCS	1080 gm	33	38	<10	20	<10	<10	<3	7,8	yes
90	1094924	24-04-2021	24-04-2021	44 days	female	AGA	27+2 wk	LSCS	1000 gm	33+4	63	<10	38	<10	71	30	6,9	yes
91	1106779	11-05-2021	11-05--2021	23 days	male	SGA	28 wk	LSCS	1080 gm	31+2	50	20	60	31	59	35	7,9	yes
92	1110544	18-05-2021	18-05-2021	28 days	female	AGA	26 wks	LSCS	820 gm	30	57	15	95	51	83	43	3,7,9	yes

S.No.	MRD	Reason For admission								Neonatal Morbidities										
		Respiratory symptoms	Respiratory Failure	Sepsis	Perinatal Asphyxia	Seizures	Hypoglycemia	Hyperbilirubinemia	Metabolic	Asphyxia needing BMV	Need for ventilation	Duration of Ventilator	RDS	Need for surfactant	AOP (Apnea Of Prematurity)	Feed Intolerance	Inotropes	CPAP	NEC	Phototherapy
56	999307	yes	yes	yes	yes	no	yes	yes	no	yes	yes	5 days	yes	no	yes	yes	yes	yes	yes	yes
57	1001516	yes	no	yes	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	yes	no
58	1001517	yes	no	yes	no	no	no	no	no	yes	yes	5 days	yes	yes	no	no	yes	no	no	yes
59	1001877	yes	no	yes	no	no	yes	yes	no	no	no	n/a	yes	yes	yes	yes	no	yes	no	yes
60	1003240	yes	yes	yes	yes	no	no	yes	no	yes	yes	2 days	yes	yes	yes	yes	no	yes	no	yes
61	1004900	yes	yes	yes	no	no	no	yes	no	no	yes	2 days	yes	yes	yes	yes	yes	yes	yes	yes
62	1006494	yes	yes	yes	yes	no	yes	yes	no	yes	yes	7 days	yes	yes	yes	yes	yes	yes	yes	yes
63	1014058	yes	yes	yes	yes	no	yes	no	yes	yes	yes	5 days	yes	no	yes	no	no	yes	no	yes
64	1016347	yes	yes	yes	yes	no	yes	yes	no	yes	no	3 days	yes	no	no	yes	no	yes	no	yes
65	1014916	yes	yes	yes	yes	no	yes	yes	no	yes	yes	8 days	yes	yes	yes	yes	yes	yes	no	yes
66	1019279	yes	yes	yes	yes	no	no	no	no	yes	yes	7 days	yes	yes	yes	no	yes	yes	no	yes
67	1020325	yes	yes	yes	no	no	yes	yes	no	no	yes	24 hour	yes	yes	yes	no	no	yes	no	yes
68	1020986	yes	yes	yes	yes	no	no	yes	no	yes	yes	1 day	yes	no	no	no	no	yes	no	yes
69	1023020	yes	yes	yes	yes	no	no	no	no	yes	yes	8 days	yes	yes	yes	no	yes	yes	yes	yes
70	1051590	yes	no	yes	no	no	no	yes	no	yes	no	n/a	no	no	no	no	no	yes	no	yes
71	900698	yes	no	yes	no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	no	yes	no
72	910155	yes	no	yes	no	no	no	yes	no	no	no	n/a	yes	no	no	no	no	no	no	yes
73	909463	yes	no	yes	no	no	yes	yes	no	yes	no	n/a	yes	no	no	no	no	no	no	yes
74	909464	yes	yes	yes	no	no	yes	yes	no	yes	yes	6 days	yes	yes	yes	yes	yes	yes	yes	yes
75	964512	yes	yes	yes	yes	yes	no	no	yes	yes	yes	1 day	yes	yes	yes	yes	yes	yes	no	yes
76	1030055	yes	yes	yes	yes	no	yes	yes	no	yes	yes	10 days	yes	yes	yes	yes	yes	yes	no	yes
77	1032798	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	13 days	yes	yes	yes	yes	no	yes	no	yes
78	1050916	yes	yes	yes	yes	no	yes	yes	no	yes	yes	7 days	yes	yes	yes	no	no	yes	no	yes
79	1052416	yes	yes	yes	no	no	yes	no	yes	yes	yes	6 days	yes	yes	no	no	no	yes	no	yes
80	1055316	yes	yes	yes	no	no	yes	no	no	no	no	n/a	yes	yes	no	no	no	yes	no	yes
81	1055469	yes	yes	yes	yes	no	no	yes	no	yes	yes	3 days	yes	yes	no	no	no	no	yes	no
82	1055470	yes	yes	yes	yes	no	no	yes	no	yes	yes	4 days	yes	yes	no	yes	no	yes	no	yes
83	1055471	yes	yes	yes	yes	no	yes	yes	no	yes	yes	3 days	yes	yes	no	no	no	yes	no	yes
84	1077138	yes	yes	yes	yes	no	no	yes	no	yes	yes	5 days	yes	yes	no	yes	no	yes	yes	yes
85	1077938	yes	yes	yes	no	no	yes	yes	no	no	no	15 days	no	no	no	no	yes	no	no	yes
86	1077941	yes	yes	yes	no	no	yes	yes	no	no	no	12 days	no	no	yes	yes	no	yes	yes	yes
87	1089499	yes	yes	yes	no	no	no	yes	no	no	yes	1 day	yes	no	no	no	yes	yes	yes	yes
88	1090261	yes	yes	yes	no	no	no	no	no	yes	yes	3 days	yes	yes	no	no	no	no	yes	yes
89	1101098	yes	yes	yes	no	no	no	yes	no	no	yes	1 day	yes	yes	yes	yes	no	yes	yes	no
90	1094924	yes	yes	yes	yes	no	yes	yes	no	yes	yes	1 day	yes	yes	no	no	no	yes	yes	yes
91	1106779	yes	no	yes	no	no	no	yes	no	yes	yes	2 days	yes	yes	no	no	no	yes	no	yes
92	1110544	yes	yes	yes	yes	no	no	yes	no	yes	yes	4 days	yes	yes	yes	yes	yes	yes	yes	yes

S.No.	MRD	Exchange Transfusion	ROP	Sepsis	Anthropometric Information						Day of minimum weight	Minimun weight	Daily weight gain D1	Daily weight gain D2	Daily weight gain D3	Daily weight gain D4	Daily weight gain D5	Daily weight gain D6	Day7	Day 8	Day 9	Day 10	Day11
					B.wt	Z - SCORE	Gestation wt.	NBS	LMP	EDD													
56	999307	no	no	yes	830 gm	-0.2	26+5 wk	28 wk	24-06-2020	16-03-2021	8	800	825 gm	800 gm	795 gm	795 gm	810 gm	815 gm	810 gm	800 gm	800 gm	820 gm	830 gm
57	1001516	no	no	no	1380 gm	0.24	29+4 wk	30 wk	24-05-2020	28-02-2021	8	1190	1345 gm	1315 gm	1240 gm	1215 gm	1195 gm	1205 gm	1180 gm	1190 gm	1210 gm	1230 gm	1230 gm
58	1001517	no	no	yes	1220 gm	-0.33	29+ 4 wk	30 wk	24-05-2020	28-02-2021	7	1140	1230 gm	1240 gmm	1250 gm	1220 gm	1190 gm	1150 gm	1140 gm	1155 gm	1160 gm	1180 gm	1250 gm
59	1001877	no	no	yes	1030 GM	-0.91	29+3 wk	30 wk	26-05-2020	02-03-2020	5	905	980 gm	950 gm	930 gm	920 gm	905 gm	920 gm	940 gm	955 gm	940 gm	960 g	940 gm
60	1003240	no	no	yes	1000 gm	-1.3	30+1 wk	30 wk	24-05-2020	30-04-2021	6	845	940 gm	940 gm	950 gm	880 gm	845 gm	845 gm	855 gm	855 gm	860 gm	900 gm	925 gm
61	1004900	no	no	yes	1040 gm	-1.59	31+1 wk	32 wk	21-05-2020	25-02-2020	5	955	1150 gm	985 gm	975 gm	970 gm	955 gm	980 gm	970 gm	995 gm	1025 gm	1050 gm	1080 gm
62	1006494	no	no	yes	860 gm	-1.46	29+3 wk	30 wk	07-06-2020	14-03-2021	4	830	860 gm	840 gm	840 gm	830 gm	845 gm	850 gm	880 gm	860 gm	875 gm	895 gm	910 gm
63	1014058	no	no	yes	1200 gm	-1.49	31+6 wk	32 wk	09-06-2020	16-03-2021	1	1045	1045 gm	1070 gm	1080 gm	1095 gm	1080 gm	1080 gm	1090 gm	1075 gm	1080 gm	1090 gm	1075 gm
64	1016347	no	no	no	1380 gm	-1.66	33+4 wk	34 wk	01-06-2020	08-03-2021	3	1230	1305 gm	1285 gm	1230 gm	1280 gm	1270 gm	1280 gm	1385 gm	1375 gm	1350 gm	1335 gm	1315 gm
65	1014916	no	no	yes	1150 gm	0.42	27+6 wk	28 wk	02-07-2020	15-04-2021	6	995	1080 gm	1030 gm	1025 gm	1010 gm	1000 gm	995 gm	1000 gm	990 gm	1060 gm	1080 gm	1095 gm
66	1019279	no	no	no	780 gm	-0.16	26+1 wk	28 wk	29-07-2020	05-05-2021	11	700	780 gm	760 gm	750 gm	760 gm	740 gm	750 gm	760 gm	770 gm	705 gm	710 gm	700 gm
67	1020325	no	no	no	1230 gm	0.69	28 wk	30 wk	19-07-2020	25-04-2021	6	1095	1200 gm	1180 gm	1160 gm	1140 gm	1065 gm	1095 gm	1135 gm	1145 gm	1160 gm	1160 gm	1180 gm
68	1020986	no	no	no	930 gm	-0.12	27 wk	28 wk	28-07-2020	04-05-2021	4	860	900 gm	860 gm	845 gm	860 gm	890 gm	915 gm	875 gm	870 gm	865 gm	870 gm	870 gm
69	1023020	no	no	no	560 gm	-1.33	25+4 wk	26 wk	03-08-2020	10-05-2021	4	445	560 gm	540 gm	550 gm	445 gm	445 gm	460 gm	545 gm	530 gm	540 gm	550 gm	500 gm
70	1051590	no	no	no	1200 gm	-1.95	32+6 wk	32 wk	19-07-2020	25-04-2021	6	1150	1190 gm	1180 gm	1175 gm	1160 gm	1150 gm	1155 gm	1180 gm	1210 gm	1240 gm	1265 gm	1275 gm
71	900698	no	no	no	1220 gm	0.54	28+1 wk	30 wk	10-08-2019	16-05-2020	3	1040	1140 gm	1080 gm	1040 gm	1040 gm	1155 gm	1160 gm	1060 gm	1060 gm	1060 gm	1060 gm	1050 gm
72	910155	no	no	no	1260 gm	-1.43	32+4 wk	32 wk	11-07-2020	19-04-2021	3	1040	1140 gm	1100 gm	1040 gm	1085 gm	1090 gm	1140 gm	1160 gm	1170 gm	1190 gm	1205 gm	1240 gm
73	909463	no	no	no	1420 gm	0.13	30+3 wk	32 wk	03-08-2019	09-05-2020	4	1225	1355 gm	1285 gm	1265 gm	1225 gm	1270 gm	1295 gm	1300 gm	1300 gm	1320 gm	1350 gm	1370 gm
74	909464	no	no	yes	960 gm	-1.25	30+3 wk	30 wk	03-08-2019	09-05-2020	5	900	915 gm	920 gm	935 gm	990 gm	900 gm	920 gm	945 gm	960 gm	970 gm	975 gm	985 gm
75	964512	no	yes	yes	980 gm	-0.82	29+4 wk	30 wk	16-02-2020	23-11-2020	6	895	960 gm	950 gm	945 gm	910 gm	900 gm	895 gm	900 gm	910 gm	920 gm	900 gm	910 gm
76	1030055	no	no	yes	890 gm	0.31	26 wk	28 wk	19-08-2020	26-05-2021	6	770	830 gm	785 gm	800 gm	775 gm	775 gm	770 gm	775 gm	805 gm	765 gm	780 gm	845 gm
77	1032798	no	yes	yes	1080 gm	-0.94	29+6 wk	30 wk	28-07-2020	04-05-2021	8	950	1025 gm	1015 gm	955 gm	1000 gm	955 gm	965 gm	975 gm	950 gm	960 gm	980 gm	975 gm
78	1050916	no	no	yes	1120 gm	0.9	27 wk	28 wk	04-09-2020	11-06-2021	11	1005	1080 gm	1040 gm	1030 gm	1025 gm	1090 gm	1070 gm	1030 gm	1040 gm	1015 gm	1015 gm	1005 gm
79	1052416	no	no	no	960 gm	-0.1	27+5 wk	28 wk	31-08-2020	09-06-2021	6	860	930 gm	900 gm	880 gm	860 gm	870 gm	860 gm	880 gm	870 gm	880 gm	895 gm	920 gm
80	1055316	no	no	no	1000 gm	-0.5	28+6 wk	28 wk	25-08-2020	03-06-2020	7	940	1000 gm	920 gm	940 gm	980 gm	930 gm	930 gm	940 g m	935 gm	945 gm	965 gm	940 gm
81	1055469	no	no	yes	1250 gm	0.04	29+4 wk	30 wk	26-08-2020	02-06-2021	6	1070	1250 gm	1150 gm	1090 gm	1070 gm	1070 gm	1070 gm	1090 gm	1120 gm	1135 gm	1153 gm	1170 gm
82	1055470	no	no	no	1370 gm	0.2	29+4 wk	30 wk	26-08-2020	02-06-2021	5	1230	1370 gm	1385 gm	1345 gm	1250 gm	1230 gm	1240 gm	1235 gm	1255 gm	1250 gm	1265 gm	1245 gm
83	1055471	no	no	no	1155 gm	-0.35	29+4 wk	30 wk	26-08-2020	02-06-2021	7	1025	1150 gm	1200 gm	1120 gm	1035 gm	1025 gm	1035 gm	1025 gm	1045 gm	1040 gm	1120 gm	1085 gm
84	1077138	no	no	no	1375 gm	-0.45	30+5 wk	32 wk	31-08-2020	09-06-2021	13	1290	1370 gm	1300 gm	1290 gm	1275 gm	1275 gm	1260 gm	1345 gm	1330 gm	1385 gm	1350 gm	1300 gm
85	1077938	no	no	yes	980 gm	-0.03	27+2 wk	28 wk	19-09-2020	26-06-2021	9	940	920 gm	940 gm	950 gm	960 gm	960 gm	950 gm	940 gm	950 gm	940 gm	950 gm	940 gm
86	1077941	no	no	no	795 gm	-0.66	27+2 wk	28 wk	19-09-2020	26-06-2021	7	720	730 gm	740 gm	740 gm	740 gm	730 gm	720 gm	720 gm	730 gm	730 gm	730 gm	755 gm
87	1089499	no	no	yes	960 gm	0.32	27 wk	28 wk	05-10-2020	12-07-2021	6	840	970 gm	935 gm	870 gm	870 gm	860 gm	840 gm	870 gm	860 gm	870 gm	870 gm	880 gm
88	1090261	no	no	no	1400 gm	0.41	29+3 wk	30 wk	26-09-2020	03-07-2021	12	1240	1445 gm	1450 gm	1415 gm	1435 gm	1410 gm	1400 gm	1370 gm	1330 gm	1290 gm	1280 gm	1250 gm
89	1101098	no	no	yes	1080 gm	-0.32	28+4 wk	30 wk	13-10-2020	10-07-2021	5	925	1050 gm	1010 gm	960 gm	925 gm	925 gm	940 gm	940 gm	960 gm	985 gm	985 gm	990 gm
90	1094924	no	no	no	1000 gm	0.34	27+2 wk	28 wk	13-10-2020	22-07-2021	3	830	980 gm	920 gm	830 gm	860 gm	865 gm	850 gm	840 gm	850 gm	850 gm	865 gm	870 gm
91	1106779	no	no	no	1080 gm	0.01	28 wk	30 wk	10-10-2020	17-07-2021	5	995	1080 gm	1000 gm	980 gm	1000 gm	995 gm	1010 gm	1020 gm	1045 gm	1070 gm	1085 gm	1110 gm
92	1110544	no	no	no	820 gm	-0.84	26 wk	28 wk	17-11-2020	24-08-2021	8	800	840 gm	800 gm	840 gm	825 gm	820 gm	800 gm	810 gm	800 gm	780 gm	760 gm	800 gm

S.No.	MRD	Day 12	Day 13	Day 14	D 15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31	D32	D33	D34	D35	D36
56	999307	830 gm	840 gm	835 gm	845 gm	840 gm	850 gm	865 gm	860 gm	860 gm	870 gm	860 gm	870 gm	880 gm	885 gm	910 gm	930 gm	940 gm	955 gm	990 gm	1020 gm	1050 gm	1050 gm	1050 gm	1050 gm	1070 gm
57	1001516	1230 gm	1235 gm	1240 gm	1210 gm	1235 gm	1245 gm	1260 gm	1280 gm	1305 gm	1320 gm	1350 gm														
58	1001517	1240 gm	1220 gm	1240 gm	1220 gm	1225 gm	1250 gm	1265 gm	1280 gm	1275 gm	1295 gm	1310 gm	1340 gm	1350 gm	1355 gm											
59	1001877	955 gm	980 gm	990 gm	1000 gm	1010 gm	1020 gm	1030 gm	1045 gm	1055 gm	1060 gm	1075 gm	1085 gm	1100 gm	1120 gm	1135 gm	1160 gm	1175 gm	1200 gm	1240 gm	1255 gm	1270 gm	1300 gm	1310 gm	1345 gm	1360 gm
60	1003240	970 gm	980 gm	1000 gm	1020 gm	1040 gm	1030 gm	1010 gm	1025 gm	1030 gm	1030 gm	1040 gm	1060 gm	1120 gm	1140 gm	1150 gm	1165 gm	1170 gm	1190 gm	1180 gm	1190 gm	1205 gm	1185 gm	1240 gm	1265 gm	1280 gm
61	1004900	1095 gm	1100 gm	1115 gm	1110 gm	1130 gm	1145 gm	1155 gm	1165 gm	1180 gm	1210 gm	1215 gm	1235 gm	1250 gm	1285 gm	1300 gm	1305 gm	1315 gm	1340 gm	1355 gm	1360 gm	1365 gm				
62	1006494	940 gm	935 gm	950 gm	960 gm	970 gm	985 gm	1000 gm	1010 gm	1015 gm	1040 gm	1030 gm	1035 gm	1060 gm	1075 gm	1090 gm	1105 gm	1115 gm	1160 gm	1175 gm	1180 gm	1195 gm	1210 gm	1240 gm	1285 gm	1300 gm
63	1014058	1080 gm	1090 gm	1100 gm	1135 gm	1180 gm	1195 gm	1215 gm	1235 gm	1225 gm	1270 gm	1270 gm	1240 gm	1255 gm	1300 gm	1350 gm	1390 gm	1430 gm	1450 gm	1480 gm	1495 gm	1535 gm	1560 gm	1570 gm		
64	1016347	1335 gm	1340 gm	1350 gm	1370 gm	1375 gm	1400 gm	1405 gm	1415 gm	1370 gm	1450 gm	1435 gm	1435 gm	1490 gm	1510 gm											
65	1014916	1100 gm	1110 gm	1130 gm	1145 gm	1180 gm	1190 gm	1220 gm	1240 gm	1290 gm	1320 gm	1320 gm	1370 gm	1395 gm	1410 gm	1440 gm	1460 gm	1450 gm	1520 gm	1550 gm	1515 gm	1550 gm	1540 gm	1570 gm	1670 gm	1640 gm
66	1019279	710 gm	700 gm	730 gm	750 gm	750 gm	730 gm	760 gm	800 gm	780 gm	820 gm	820 gm	820 gm	830 gm	780 gm	780 gm	770 gm	760 gm								
67	1020325	1170 gm	1155 gm	1170 gm	1155 gm	1170 gm	1200 gm	1210 gm	1215 gm	1260 gm	1340 gm	1340 gm	1350 gm	1370 gm	1395 gm	1405 gm	1425 gm	1495 gm	1530 gm	1510 gm	1555 gm	1585 gm	1530 gm	1570 gm	1595 gm	1615 gm
68	1020986	880 gm	890 gm	905 gm	910 gm	885 gm	860 gm	870 gm	860 gm	880 gm	900 gm	890 gm	885 gm	880 gm	895 gm	895 gm	890 gm	900 gm	905 gm	930 gm	1005 gm	1070 gm	1135 gm	1070 gm	1050 gm	1065 gm
69	1023020	510 gm	510 gm	505 gm	515 gm	510 gm	510 gm	530 gm	540 gm	550 g m	560 gm	560 gm	570 gm	570 gm	575 gm	560 gm	560 gm	550 gm	570 gm	590 gm	595 gm					
70	1051590	1295 gm	1310 gm	1325 gm	1350 gm	1360 gm																				
71	900698	1065 gm	1090 gm	1140 gm	1130 gm	1140 gm	1140 gm	1160 gm	1170 gm	1190 gm	1200 gm	1150 gm	1130 gm	1200 gm	1185 gm	1225 gm	1235 gm	1240 gm	1280 gm	1310 gm	1315 gm	1340 gm	1335 gm	1355 gm	1370 gm	1370 gm
72	910155	1270 gm	1360 gm	1380 gm	1380 gm	1420 gm																				
73	909463	1380 gm	1400 gm	1445 gm	1460 gm	1500 gm	1550 gm	1560 gm	1600 gm	1580 gm	1580 gm	1620 gm														
74	909464	1000 gm	1005 gm	1010 gm	1020 gm	1025 gm	1040 gm	1050 gm	1060 gm	1065 gm	1075 gm	1080 gm	1085 gm	1100 gm	1120 gm	1140 gm	1155 gm	1185 gm	1210 gm	1245 gm	1255 gm	1260 gm	1280 gm	1295 gm	1300 gm	1310 gm
75	964512																									
76	1030055	950 gm	880 gm	895 gm	925 gm	935 gm	940 gm	1000 gm	995 gm	995 gm	1005 gm	1015 gm	990 gm	1005 gm	1030 gm	1060 gm	1040 gm	1100 gm	1060 gm	1120 gm	1150 gm	1140 gm	1125 gm	1130 gm	1120 gm	1140 gm
77	1032798	990 gm	990 gm	1010 gm	1015 gm	1025 gm	1030 gm	1010 gm	1020 gm	1005 gm	1005 gm	1020 gm	1045 gm	1115 gm	1120 gm	1140 gm	1105 gm	1160 gm	1155 gm	1175 gm	1195 gm	1210 gm	1250 gm	1355 gm	1260 gm	1295 gm
78	1050916	1035 gm	1020 gm	1020 gm	1035 gm	1035 gm	1025 gm	1050 gm	1070 gm	1095 gm	1120 gm	1135 gm	1140 gm	1160 gm	1180 gm	1190 gm	1200 gm	1215 gm	1200 gm	1265 gm	131o gm	1335 gm	1370 gm	1380 gm	1405 gm	1430 gm
79	1052416	925 gm	925 gm	920 gm	930 gm	950 gm	1015 gm	1025 gm	1060 gm	1085 gm	1100 gm	1115 gm	1140 gm	1145 gm	1155 gm	1165 gm	1165 gm	1185 gm	1200 gm	1210 gm	1240 gm	1235 gm	1260 gm	1265 gm	1265 gm	1285 gm
80	1055316	950 gm	960 gm	980 gm	1000 gm	1020 gm	1030 gm	1040 gm	1055 gm	1070 gm	1090 gm	1120 gm	1135 gm	1145 gm	1155 gm	1170 gm	1205 gm	1215 gm	1235 gm	1260 gm	1295 gm	1315 gm	1330 gm	1345 gm		
81	1055469	1160 gm	1190 gm	1200 gm	1220 gm	1230 gm	1250 gm	1240 gm	1260 gm	1280 gm	1290 gm	1320 gm	1355 gm	1370 gm	1410 gm	1420 gm	1430 gm	1450 gm	1495 gm	1500 gm	1560 gm	1530 gm	1530 gm			
82	1055470	1265 gm	1295 gm	1315 gm	1320 gm	1330 gm	1360 gm	1380 gm	1410 gm	1410 gm	1420 gm	1425 gm	1450 gm	1515 gm	1520 gm	1550 gm	1565 gm	1555 gm	1590 gm	1590 gm	1625 gm					
83	1055471	1100 gm	1125 gm	1135 gm	1150 gm	1165 gm	1170 gm	1175 gm	1180 gm	1170 gm	1180 gm	1170 gm	1185 gm	1205 gm	1240 gm	1250 gm	1280 gm	1285 gm	1315 gm	1335 gm	1345 gm	1380 gm	1385 gm	1395 gm	1440 gm	1450 gm
84	1077138	1295 gm	1290 gm	1300 gm	1300 gm	1300 gm	1350 gm	1325 gm	1320 gm	1345 gm	1365 gm	1350 gm	1395 gm	1430 gm	1525 gm	1480 gm	1485 gm	1485 gm	1520 gm	1525 gm	1570 gm	1610 gm	1650 gm	1670 gm	1680 gm	1720 gm
85	1077938	960 gm	980 gm	995 gm	1020 gm	1050 gm	1050 gm	1055 gm	1065 gm	1095 gm	1100 gm	1140 gm	1160 gm	1170 gm	1160 gm	1170 gm	1175 gm	1170 gm	1180 gm	1340 gm	1420 gm	1500 gm	1470 gm	1470 gm	1460 gm	
86	1077941	735 gm	750 gm	780 gm	810 gm	820 gm	830 gm																			
87	1089499	890 gm	905 gm	920 gm	925 gm	940 gm	955 gm	980 gm	990 gm	1010 gm	1010 gm	1015 gm	1015 gm	1035 gm	1025 gm	1045 gm	1090 gm	1120 gm	1135 gm	1160 gm	1175 gm	1180 gm	1200 gm	1215 gm	1230 gm	1240 gm
88	1090261	1240 gm	1260 gm	1300 gm	1310 gm	1350 gm	1395 gm	1400 gm	1400 gm	1415 gm	1435 gm	1480 gm	1500 gm	1475 gm	1530 gm	1560 gm	1595 gm	1625 gm	1680 gm	1665 gm	1695 gm					
89	1101098	980 gm	990 gm	990 gm	990 gm	1000 gm	1020 gm	1040 gm	1060 gm	1080 gm	1075 gm	1200 gm	1215 gm	1250 gm	1255 gm	1275 gm	1290 gm	1300 gm	1320 gm	1340 gm	1385 gm					
90	1094924	895 gm	890 gm	890 gm	930 gm	955 gm	955 gm	955 gm	970 gm	980 gm	990 gm	1000 gm	1000 gm	1050 gm	1060 gm	1075 gm	1095 gm	1100 gm	1110 gm	1115 gm	1140 gm	1150 gm	1185 gm	1200 gm	1210 gm	1245 gm
91	1106779	1130 gm	1145 gm	1165 gm	1190 gm	1220 gm	1250 gm	1270 gm	1300 gm	1080 gm	1345 gm															
92	1110544	860 gm	890 gm	900 gm	910 gm	915 gm	925 gm	940 gm	950 gm	965 gm	950 gm	990 gm														

S.No.	MRD	D37	D38	D39	D40	D41	D42	D43	D44	D45	D46	D47	D48	D49	D50	D51	D52	D53	D54	D55	D56	D57	D58	D59	D60	D61
56	999307	1080 gm	1090 gm	1090 gm	1135 gm	1145 gm	1160 gm	1200 gm	1240 gm	1275 gm	1285 gm	1305 gm	1330 gm	1340 gm	1355 gm	1390 gm	1410 gm									
57	1001516																									
58	1001517																									
59	1001877	1370 gm																								
60	1003240	1295 gm	1300 gm	1310 gm	1340 gm	1345 gm																				
61	1004900																									
62	1006494	1315 gm																								
63	1014058																									
64	1016347																									
65	1014916	1630 gm	1620 gm	1610 gm	1655 gm	1645 gm	1645 gm	1690 gm	1690 gm	1570 gm	1620 gm	1660 gm	1595 gm													
66	1019279																									
67	1020325	1645 gm	1690 gm																							
68	1020986	1090 gm	1160 gm	1135 gm	1200 gm	1240 gm	1285 gm	1290 gm	1215 gm	1190 gm	1220 gm	1230 gm	1230 gm	1280 gm	1285 gm	1295 gm	1330 gm	1360 gm								
69	1023020																									
70	1051590																									
71	900698	1375 gm	1400 gm	1450 gm	1490 gm	1500 gm	1560 gm	1560 gm	1560 gm	1620 gm																
72	910155																									
73	909463																									
74	909464	1340 gm	1335 gm	1360 gm	1350 gm																					
75	964512																									
76	1030055	1115 gm	1120 gm	1150 gm	1160 gm	1120 gm	1150 gm	1165 gm	1180 gm	1180 gm	1190 gm	1200 gm	1200 gm	1205 gm	1230 gm	1260 gm	1300 gm	1280 gm	1320 gm	1350 gm	1385 gm	1340 gm	1385 gm			
77	1032798	1280 gm	1270 gm	1320 gm	1280 gm	1230 gm	1270 gm	1400 gm																		
78	1050916	1420 gm	1420 gm	1460 gm	1490 gm	1530 gm	1500 gm	1430 gm	1520 gm	1565 gm	1530 gm	1570 gm	1585 gm	1630 gm	1665 gm	1700 gm	1735 gm	1770 gm	1810 gm	1840 ,gm	1880 gm	1885 gm				
79	1052416	1305 gm	1320 gm	1295 gm																						
80	1055316																									
81	1055469																									
82	1055470																									
83	1055471																									
84	1077138	1695 gm	1695 gm	1640 gm	1610 gm	1665 gm	1720 gm	1750 gm	1805 gm	1795 gm	1825 gm	1905 gm														
85	1077938																									
86	1077941																									
87	1089499	1255 gm	1260 gm	1275 gm	1300 gm	1300 gm	1295 gm	1310 gm	1330 gm	1340 gm	1345 gm	1355 cm														
88	1090261																									
89	1101098																									
90	1094924	1250 gm	1285 gm	1290 gm	1310 gm	1340 gm	1350 gm	1355 gn																		
91	1106779																									
92	1110544																									

S.No.	MRD	D62	D63	D64	D65	D66	D67	D68	D69	Z - SCORE	HC AT ADM	Z - SCORE	HC WEEK1	HC WEEK2	HC WEEK 3	HC WEEK4	HC WEEK 5	HC WEEK6	HC WEEK 7	HC WEEK 8	HC WEEK 9	HC WEEK 10	HC WEEK 11
56	999307									-2.18	25 cm	0.85	26 cm	27 cm	28 cm	29 cm	29.5 cm	30 cm	30.5 cm	31 cm			
57	1001516									-1.6	29 cm	1.3	29.5 cm	29.5 cm	30 cm								
58	1001517									-1.8	29 cm	1.3	29 cm	29.5 cm	29.5 cm	30 cm							
59	1001877									-2.6	26 cm	-0.69	27 cm	28 cm	29 cm	29.5 cm	31 cm						
60	1003240									-3.5	27 cm	-0.46	27.5 cm	28.5 cm	30 cm	31 cm	31.5 cm	32 cm					
61	1004900									-3.27	28 cm	-0.41	28.5 cm	29 cm	30 cm	31 cm	32 cm						
62	1006494									-3.06	25 cm	-1.39	25 cm	26.5 cm	28 cm	29.5 cm	30 cm	31 cm					
63	1014058									-2.43	28 cm	-0.83	29 cm	30 cm	31 cm	31 cm							
64	1016347									-3.69	32 cm	1.16	32 cm	32.5 cm	33 cm	33 cm							
65	1014916									-2.13	26.5 cm	0.72	27 cm	27.5 cm	28 cm	28.5 cm	29 cm	30 cm	31 cm				
66	1019279									-1.7	24 cm	0.51	24 cm	25 cm	25.5 cm								
67	1020325									1.06	27 cm	0.98	28 cm	29 cm	30 cm	30.5 cm	31 cm	32 cm					
68	1020986									-2.55	25 cm	0.24	25 cm	25.5 cm	26 cm	27 cm	27.5 cm	28 cm	29 cm				
69	1023020									-2.19	21 cm	-1.41	21.5 cm	21.5 cm	22 cm	22 cm							
70	1051590									-2.78	26.5 cm	-2.45	27 cm	27.5 cm									
71	900698									-1.92	25 cm	-0.55	25 cm	25 cm	26 cm	26.5 cm	27 cm	27.5 cm					
72	910155									-2.43	27 cm	-1.59	28 cm	29 cm	29.5 cm								
73	909463									-1.11	29 cm	1.13	29.5 cm	29.5 cm	30 cm								
74	909464									-3.75	26 cm	-0.93	26 cm	26.5 cm	27 cm	28 cm	28.5 cm	30 cm					
75	964512									-1.77	24.5 cm	-1.43	25 cm										
76	1030055									-2.48	24 cm	0.23	25 cm	25 cm	25 cm	25 cm	26 cm	28.5 cm	29 cm	29 cm			
77	1032798									-3.27	26.5 cm	-0.62	26.5 cm	27 cm	27 cm	27.5 cm	29 cm	30 cm					
78	1050916									-1.13	26 cm	0.98	27 cm	27 cm	27.5 cm	28 cm	29 cm	29.5 cm	30 cm				
79	1052416									-1.81	25 cm	0.15	25 cm	26 cm	26 cm	26 cm	28 cm						
80	1055316									-2.01	26 cm	0.09	26 cm	26.5 cm	27.5 cm	30 cm	30 cm						
81	1055469									-1.51	26 cm	-0.38	26 cm	26.5 cm	27 cm	27.5 cm	29 cm						
82	1055470									-1.68	29.5 cm	1.65	29.5 cm	30 cm	30.5 cm	31 cm							
83	1055471									-2.07	25 cm	-1.08	25 cm	25 cm	26 cm	27 cm	28 cm	28.5 cm					
84	1077138									-2.7	29 cm	0.55	29 cm	29.5 cm	30 cm	31 cm	32 cm	32.5 cm					
85	1077938									-1.52	24.5 cm	-0.32	25.5 cm	25.5 cm	26 cm	26 cm	26.5 cm	27 cm					
86	1077941									1.46	25 cm	0.44	25 cm	25 cm									
87	1089499									-1.98	23.5 cm	-0.47	24 cm	24 cm	25.5 cm	26 cm	26 cm	27 cm	28 cm				
88	1090261									-1.36	28 cm	0.7	28 cm	28 cm	28.5 cm	29 cm							
89	1101098									-0.66	25 cm	-0.83	25 cm	26 cm	27 cm	28 cm							
90	1094924									-1.73	24 cm	-0.3	24 cm	25 cm	26 cm	27 cm	27.5 cm	28 cm					
91	1106779									-0.84	26 cm	0.26	26.5 cm	27 cm	28 cm								
92	1110544									-1.02	25.5 cm	0.31	25.5 cm	26 cm	26.5 cm	27 cm							

S.No.	MRD	Z- SCORE	LENGTH AT ADM.	Z - SCORE	LENGTH W1	LENGTH W2	LENGTH WK 3	LENGTH WK 4	LENGTH W5	LENGTH W 6	LENGTH W 7	LENGTH W8	LENGTH W9	LENGTH W 10	LENGTH W11	Z - SCORE	OUTCOME
56	999307	-0.09	34 cm	0.03	35 cm	37 cm	38.5 cm	40 cm	41 cm	42.5 cm	43 cm	44 cm				-0.28	SHIFTED
57	1001516	-0.1	36 cm	-1.05	37.5 cm	39 cm	41 cm									-0.86	SHIFTED
58	1001517	-0.35	36 cm	-1.05	37.5 cm	39 cm	41 cm	43 cm								-0.31	SHIFTED
59	1001877	-0.54	37 cm	-0.57	38 cm	39.5 cm	41 cm	43.5 cm	44.5 cm							-0.53	SHIFTED
60	1003240	-0.58	37 cm	-0.96	38.5 cm	40 cm	41 cm	43.5 cm	44 cm	45 cm						-1.03	SHIFTED
61	1004900	-0.44	37 cm	-1.5	38 cm	40 cm	41.5 cm	42.5 cm	44 cm							-1.3	SHIFTED
62	1006494	-0.91	34 cm	-1.75	35 cm	36.5 cm	37.5 cm	38 cm	40 cm	41.5 cm						-2.1	SHIFTED
63	1014058	-0.84	40.5 cm	-0.51	41 cm	41.5 cm	43 cm	44.5 cm								-0.82	SHIFTED
64	1016347	-0.09	40 cm	-1.29	41 cm	43 cm	44.5 cm	45.5 cm								-0.95	SHIFTED
65	1014916	-0.62	38 cm	0.73	39 cm	40 cm	40.5 cm	41 cm	43 cm	44 cm	44.5 cm					-0.6	SHIFTED
66	1019279	-1.1	35 cm	0.86	35 cm	35.5 cm	36 cm									-1.03	EXPIRED
67	1020325	0.91	41 cm	1.89	42 cm	42 cm	42.5 cm	43 cm	43.5 cm							0.18	SHIFTED
68	1020986	-1.81	38 cm	1.25	39 cm	39.5 cm	40 cm	41 cm	41.5 cm	42 cm	43 cm					-1.06	SHIFTED
69	1023020	-3.43	30 cm	-1.14	30.5 cm	31 cm	31 cm									-2.92	EXPIRED
70	1051590	-3.04	37 cm	-2.44	38 cm	39.5 cm										-2.69	SHIFTED
71	900698	-2.81	37 cm	0.15	37 cm	39 cm	40 cm	41 cm	41.5 cm	42 cm						-1.46	SHIFTED
72	910155	-1.54	41 cm	-0.4	41 cm	42 cm	42.5 cm									-1.06	SHIFTED
73	909463	-0.26	43 cm	1.53	43 cm	43.5 cm	44 cm									0.15	SHIFTED
74	909464	-1.82	36 cm	-1.18	36 cm	37.5 cm	39 cm	39 cm	40 cm	41 cm						-2.41	SHIFTED
75	964512	-2.15	36 cm	-0.74	36 cm											-1.62	EXPIRED
76	1030055	-1.81	37 cm	1.48	38 cm	38 cm	38 cm	38.5 cm	39 cm	39.5 cm	41 cm	42 cm				-1.46	SHIFTED
77	1032798	-1.86	34 cm	-2	34 cm	34.5 cm	35 cm	35.5 cm	36 cm	36 cm						-4.64	EXPIRED
78	1050916	-0.99	37 cm	0.83	38 cm	38.5 cm	39 cm	40 cm	40.5 cm	41 cm	42 cm					-1.31	SHIFTED
79	1052416	-1.44	35 cm	-0.12	35.5 cm	36 cm	36 cm	36 cm	38 cm							-1.97	SHIFTED
80	1055316	-0.43	37 cm	0.06	37 cm	38 cm	39 cm	40 cm	41.5 cm							-0.94	SHIFTED
81	1055469	-1.1	39 cm	0.46	39 cm	40 cm	40.5 cm	41 cm	41.5 cm							-0.94	SHIFTED
82	1055470	-0.24	40 cm	0.56	40.5 cm	41 cm	42 cm	43.5 cm								-0.64	SHIFTED
83	1055471	-1.77	38 cm	0.06	38 cm	38.5 cm	40 cm	41 cm	42 cm							-1.04	SHIFTED
84	1077138	-0.75	39 cm	-0.48	39 cm	40 cm	41.5 cm	42 cm	43 cm	44.5 cm						-1.81	SHIFTED
85	1077938	-2.36	36 cm	0.23	37 cm	37 cm	37.5 cm	38 cm	38 cm	38.5 cm						-2.09	EXPIRED
86	1077941	-1.26	37.5 cm	1.22	37.5 cm	38 cm	38 cm									-0.1	EXPIRED
87	1089499	-1.76	33 cm	-0.58	33 cm	33.5 cm	34 cm	35 cm	36 cm	37 cm	38.5 cm					-2.07	SHIFTING
88	1090261	-1.42	42 cm	1.45	42 cm	42 cm	43 cm	43.5 cm								-0.29	SHIFTING
89	1101098	-0.32	34 cm	-1.32	35 cm	35.5 cm	36.5 cm	38 cm								-1.03	SHIFTING
90	1094924	-1.52	36 cm	0.57	37 cm	38.5 cm	40 cm	41 cm	42 cm	42 cm						-0.54	SHIFTING
91	1106779	-0.5	37 cm	0.23	38 cm	39 cm	40 cm									-0.4	SHIFTING
92	1110544	0.04	35 cm	-0.29	36 cm	37 cm	37.5 cm	38 cm								-0.18	SHIFTING

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Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.05.2019 has approved the plan of thesis of **Siyaram Sharan Kushwaha**, a student of your college for **MD Paediatrics** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

To study the growth pattern of very low birth weight neonates during hospital stay in neonatal intensive care unit

Supervisor
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The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

S P Singh

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

In

PEDIATRICS

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

NOVEMBER, 2018

DR. SIYARAM SHARAN KUSHWAHA

DEPARTMENT OF PEDIATRICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT
For the degree of	MD (Pediatrics)
Name of the candidate	Dr. Siyaram Sharan Kushwaha
Supervisor	Dr. Kamaldeep Arora Associate Professor, Department of Pediatrics, DMCH, Ludhiana
Co-supervisor	Dr. Deepak Bhat, Professor, Department of Pediatrics, DMCH, Ludhiana Dr. G.S. Dhooria, Associate Professor, Department of Pediatrics, DMCH, Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Very low birth weight (VLBW) neonates demonstrate distinct pattern of growth which differ from normal birth weight neonates. As advances in neonatal care have significantly improved the survival rate of VLBW preterm neonates, continuous growth monitoring from the time of birth is a good predictor of clinical status, outcomes of treatment and nutritional status. In particular, since growth has a direct effect on neurological development, monitoring of growth patterns is very important for Neonatologists. Predicting the growth of very low birth weight neonates has been a mind blender to many neonatologists till recently. Though few growth charts have been described in western literature, very limited studies has been done in India and there is no standard growth chart for Indian very low birth weight neonates. Therefore we planned to study the growth pattern of VLBW neonates in our neonatal ICU.

Aim of Study: To study the growth pattern of Very low birth weight neonates during hospital stay.

Materials & Methods:

We will follow all very low birth weight neonates who fulfill inclusion criteria. . Our aim would be to observe the serial changes in growth parameters in VLBW neonates during hospital stay by plotting the Fenton's sex specific postnatal growth curves and Ehrenkranz growth curves. The study design will be a prospective observational cohort.

Clinical Significance: Growth is the most important aspect in neonates especially for VLBW neonates, as it is important marker for neurodevelopmental outcome of VLBW neonates. Data regarding VLBW neonates in Indian context is very scarce. This study would lead to a better insight into the growth of VLBW neonates.

Keywords: VLBW, Growth, Fenton,

Candidate Sign **Supervisor Sign** **Co supervisor Sign** **Co supervisor Sign** **Principal Sign**

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis entitled **"TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT"** exist in the Department of Pediatrics, Dayanand Medical College and Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate herself under our supervision and guidance.

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APPROVAL PROFORMA
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RESEARCH & ETHICAL COMMITTEE
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Topic of Thesis	TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT
Likely date of appearing in PG examination	May, 2021
Date of enrollment	10th May, 2018
Name of Head of Department	DR. PUNEET AULAKH POONI
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2) Co-Supervisor	DR. DEEPAK BHAT DR. G.S. DHOORIA
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
1. HOD Pharmacology	1. HOD Physiology
2. HOD Surgery	2. HOD Pathology
3. HOD Pathology	3. HOD Pharmacology
4. HOD Medicine	4. HOD SPM
5. Dean Academics	5. HOD Medicine
6. Vice Principal	6. HOD Surgery
	7. HOD Obst. & Gynae.
	8. Legal Expert
	9. Secretary, IEC
	10. Dean Academics
	11. Vice Principal
	12. Principal

Approved : Yes / No

Chairperson
Research Committee

Chairperson
Research Committee

Approved : Yes / No

Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARIDUNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECTS FOR DISSERTATION

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3	COURSE OF STUDY AND SUBJECT	MD Pediatrics
4	DATE OF ADMISSION OF COURSE	10th May, 2018
5	TITLE OF THE TOPIC	TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Globally, about 18 million infants are born with a birth weight of <2500g every year.[1] Though these low birth weight (LBW) infants constitute only about 14% of the total live births, they account for 60-80% of total neonatal deaths.[2]

Postnatal growth of Very Low Birth Weight (VLBW) infants (birth weight <1500g) remains a subject of concern for neonatologists. Infants born VLBW are at increased risk for impaired growth, due to certain factors during intrauterine life, exposure to hostile ex-utero environment and poorly understood nutritional needs. Despite improvement in care of VLBW infants, they continue to suffer growth lag during neonatal period and early infancy. Most of these infants experience catch up growth much later, by 8-20 years.[3]

We all know, increase in survival of NICU graduates result in increment in numbers of very low birth weight babies and extremely low birth weight babies. Intra uterine milieu provides unlimited supply of nutrients, protection from hypothermia and microbial invasions, which turns into intermittent supply of nutrients and risk of sepsis when a neonate comes outside. This discrepancy results in overall lag in the growth of these infants; viz in weight, length, head circumference and mid arm circumference.[4-5] Growth impairment during early infancy can have permanent detrimental effects.[6] Impaired fetal and postnatal growth has been associated with neurodevelopmental delay, ischemic heart disease, impaired glucose tolerance, type-II diabetes mellitus, hypertension, and metabolic syndrome.[7,8]

Factors such as weight, gestational age, length of hospital stay, presence of respiratory distress syndrome (RDS), Broncho pulmonary dysplasia (BPD),

and sepsis have been associated with post-discharge growth and development in preterm infants.[9] An important challenge in the care of preterm infants is to reduce the incidence of neonatal and long-term morbidity.[10] It is suggested that growth during the neonatal period should mimic intrauterine growth rates to enable normal organ development, but the optimal growth pattern for preterm infants is not known.[11] VLBW infants in a particular study experienced slower linear growth during hospital stay. They need a long term follow up for catch up, as poor growth during early infancy has been shown to be associated with persistent stunting in later life.[12]

We are conducting this study to document and describe the growth patterns of VLBW infants during NICU stay, and to analyse the difference, if any, between those born appropriate or small for gestational age (AGA or SGA)

6.2 REVIEW OF LITERATURE

Postnatal growth of Very Low Birth Weight (VLBW) infants (birthweight <1500g) remains a subject of concern for neonatologists. Infants born VLBW are at increased risk for impaired growth, due to certain factors during intrauterine life, exposure to hostile ex-utero environment and poorly understood nutritional needs. Despite improvement in care of VLBW infants, they continue to suffer growth lag during neonatal period and early infancy. Most of these infants experience catch up growth much later, by 8-20 years. Poor postnatal growth has been associated with subnormal long-term physical growth and neurodevelopment outcomes.

Study done by SALUJA, et al. as Growth of Very Low Birth – Weight Indian Infants during Hospital Stay, came to a conclusion that VLBW infants suffered significant growth lag during NICU stay and exhibited disproportionately slow growth of HC and length.[13]

Study done by Rathore Ashutosh S, et al. came to a conclusion that, We need large multi centric prospective cohort study to explore the growth trends of VLBW babies in India to develop Post natal growth nomograms for VLBW babies. Long term growth of VLBW infants should be monitored as they are at risk of growth failure.[14]

Study done by Soon Min Lee , Namhyo Kim, Ran Namgung, Minsoo Park, Kookin Park & Jihyun Jeon , shown that PGF(Post natal growth failure) was negatively correlated with gestation and birth weight; additionally, PGF was associated with a higher incidence of co-morbidities.[15]

Study done by Tanis R Fenton, et al, suggest that Weight gain trajectories of preterm infants differ from fetal- infant estimates, in part because preterm

infants do not experience the growth fluctuations of the term infant around term, particularly the growth deceleration of the fertus just prior to 40 weeks.[16]

Study done by M A A Mamun et al. concludes that there was decrease in all anthropometric parameters among preterm VLBW neonate at 4 weeks of life. Despite significant decrease in somatic growth they maintained a near normal head growth.[17]

Study done by S Klevebro et al. In their cohort study of extremely preterm infants, found that the postnatal growth pattern was associated with morbidities such as ROP, BPD and NEC as well as with gestational age at birth.[18]

Study done by Ehrenkranz RA et al. have found that Postnatal growth curves suitable for clinical and research use were constructed for body weight, length, head circumference, and midarm circumference. Once birth weight was regained, weight gain (14.4-16.1 g/kg/d) approximated intrauterine rates. However, at hospital discharge, most infants born between 24 and 29 weeks of gestation had not achieved the median birth weight of the reference fetus at the same postmenstrual age. Gestational age, race, and gender had no effect on growth within 100-g birth weight strata. Appropriate-for-gestational age infants who survived to hospital discharge without developing chronic lung disease, severe intraventricular hemorrhage, necrotizing enterocolitis, or late onset-sepsis gained weight faster than comparable infants with those morbidities. More rapid weight gain was also associated with a shorter duration of parenteral nutrition providing at least 75% of the total daily fluid

volume, an earlier age at the initiation of enteral feedings, and an earlier age at achievement of full enteral feedings.[19]

Study done by Lemons JA et. Al. proposed that Survival for infants between 501 and 1500 g at birth continued to improve, particularly for infants weighing <1000 g at birth. This improvement in survival was not associated with an increase in major morbidities, because the incidence of CLD (chronic lung disease), proven NEC, and severe ICH did not change. However, poor postnatal growth remains a major concern, occurring in 99% of infants weighing <1000 g at birth. Mortality and major morbidity (CLD, severe ICH, and NEC) remain high for the smallest infants, particularly those weighing <600 g at birth.[20]

Study done by Fanaroff AA et al, to document the mortality and morbidity of infants weighing 501-1500 g at birth according to gestational age, birthweight, and sex and they found that there have been no significant increases in survival without neonatal and long-term morbidity among VLBW infants between 1997 and 2002. They also speculated that to improve survival without morbidity requires determining, disseminating, and applying best practices using therapies currently available, and also identifying new strategies and interventions.[21]

Study done by Tina Gutbrod et al have come to conclusion that Being underweight and with a short gestation (SGA and VLBW) leads to poor weight gain and head growth in infancy but does not result in poorer growth than in infants of the same birth weight but shorter gestation (AGA-BW) in the long term. SGA is related to early developmental delay and later language problems; however, neonatal complications may have a larger detrimental

effect on long term cognitive development of VLBW infants than whether they are born SGA or AGA.[22]

Study done by Brandt I, Sticker EJ, Lentze MJ. suggest that early postnatal high-energy nutrient intake for SGA preterm infants is needed to promote HC catch-up growth and to prevent negative consequences of undernutrition.[23]

Study done by De Curtis M, Rigo J. concludes that VLBW infants SGA at birth and those with early postnatal growth restriction are at high risk of later growth failure and long-term consequences. Therefore, the first objective of early nutrition should be to reduce the incidence of growth restriction at the time of discharge. Further studies on VLBW infants to evaluate the safety and beneficial effects of prolonged dietary manipulation during the first year of life are needed.[24]

Study done by Wu YJ, Yu JL, Gu R. have found in their retrospective analysis that Sufficient supply of calorie and protein should be ensured in VLBW infants, especially in SGA and severely ill infants. It was very important to feed VLBW infants as early as possible, which could improve feeding tolerance and gastrointestinal maturation. VLBW infants should receive parenteral nutrition as supplements to enteral feeding.[25]

study conducted by Were FN, Bwibo NO. suggest that the mean neonatal growth in all anthropometric measures was less than expected and by the time of their expected delivery, less than 30% of these infants had reached the 3rd percentile of the expected measurement in all the three growth parameters(weight, length,HC). Choice of milk and neonatal morbidity influenced these growth patterns. Recommendations: Routine fortification of

mother's milk or addition of preterm formula and reorganised care of sick newborns is recommended to improve early growth.[26]

Study done by Loui A et al finally reached to a conclusion that In VLBW infants, fetal growth rates are not reached with current feeding practice. In addition to inadequate nutrition, factors directly related to disease and treatment contribute to postnatal growth failure.[27]

6.3 AIMS AND OBJECTIVES OF THE STUDY

Primary aim: To study the growth pattern (weight, length and head circumference) of very low birth weight neonates during hospital stay.

7. MATERIALS AND METHODS

The study is designed as prospective observational study till the time the neonates are admitted in the level III neonatal intensive care unit, in the Division of Neonatology, Department. of Pediatrics, Dayanand medical college and hospital, Ludhiana.

7.1 SOURCE OF DATA

Very Low birth weight neonates admitted either as inborn or outborn in neonatal intensive care unit.

7.2 METHOD OF COLLECTION OF DATA

INCLUSION CRITERIA

1) All the VLBW neonates (<1500 gms) irrespective of the gestational age admitted at neonatal intensive care unit.

2. Both inborn and outborn neonates to be included in the study.

EXCLUSION CRITERIA

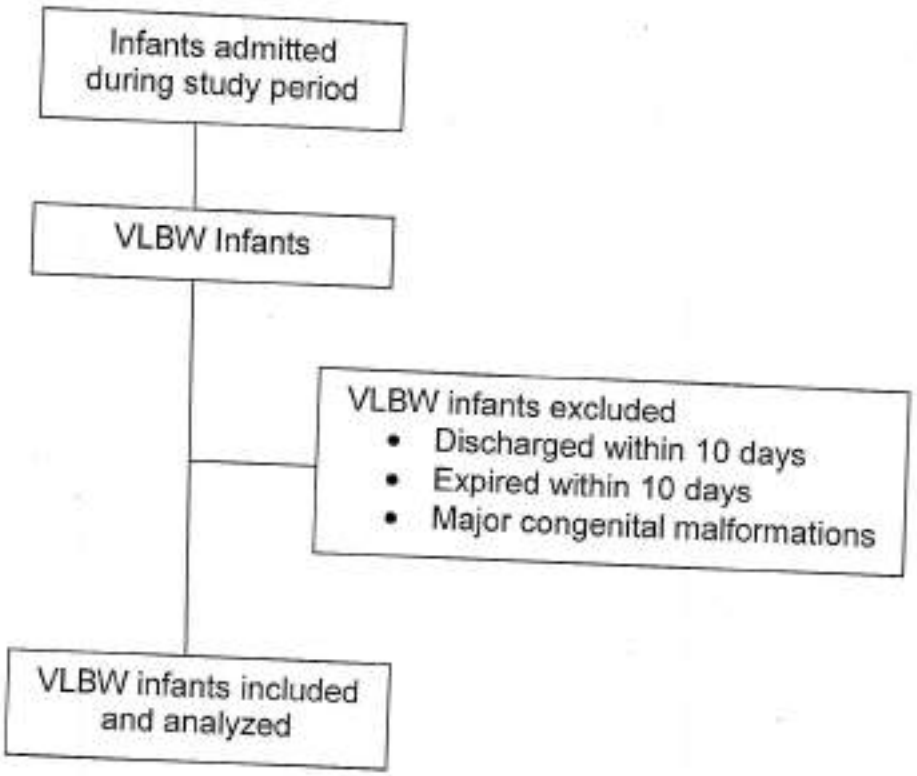
1. Major congenital malformations
2. Neonates who stayed in hospital for less than 10 days
3. Admitted after 24 hours of birth.

METHOD OF COLLECTION OF DATA

Guardian/ Parents of patient fulfilling inclusion and exclusion criteria will be enrolled in the study. They will be informed about the purpose and nature of study, risk and benefits associated with participation in the study.

Daily weight monitoring will be done of very low birth weight neonates by electronic weighing machine till the time they are admitted. The weighing scale would be calibrated weekly by standard scale. Length will be measured initially within 24 hour by infantometer, then weekly thereafter. Head

circumference (HC) will be measured by measuring tape after 24 hours and one weekly.



Study flow chart. [Enrolment]

DURATION OF STUDY: From January 2019 till June 2020.

OUTCOME: we monitor daily weight gain along with weekly length and weekly head circumference.

STATISTICAL ANALYSIS:

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY

No

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF?

Yes, attached along with.

8. LIST OF REFERENCES

1. UNICEF. State of the World's Children 2005. New York: UNICEF, 2004.
2. Bang A, Reddy MH, Deshmukh MD. Child mortality in Maharashtra. Economic Political weekly 2002;37:4947-65.
3. Hack M, Schluchter M, Cartar L, Rahman M, Cuttler L, Borawski E. Growth of very low birth weight infants to age 20 years. Pediatrics. 2003;112:30-8.
4. MM D. A review of newborn medicine in America. Am J Perinatology. 1991;8:308- 22.
5. Narayan S. Survival and morbidity in Extremely Low Birth Weight (ELBW) infants. Indian Pediatrics. 2003;40:1305
6. Embleton NE, Pang N, Cooke RJ. Postnatal malnutrition and growth retardation: an inevitable consequence of current recommendations in preterm infants? Pediatrics. 2001;107:270–3.
7. Lapillonne A, Griffin IJ. Feeding preterm infants today for later metabolic and cardiovascular outcomes. J Pediatr. 2013;162:S7–16.
8. Barker DJ. The fetal and infant origins of adult disease. BMJ. 1990;301:1111.
9. Lima PA, Carvalho M, Costa AC, Moreira ME. Variables associated with extra uterine growth restriction in very low birth weight infants. J Pediatr (Rio J). 2014;90:22–7.
10. Serenius F, Källén K, Blennow M. Express Group. Neurodevelopmental outcome in extremely preterm infants at 2.5 years after active perinatal care in Sweden. JAMA. 2013;309:1810–20.

11. Agostoni C, Buonocore G, Carnielli VP. Enteral nutrient supply for preterm infants: commentary from the European Society of Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition. J Pediatr Gastroenterol Nutr. 2010;50:85–91.
12. Knops NBB, Sneeuw CAK, Brand R, Hille ETM, Ouden AL, Wit JM, et al. Catch-up growth up to ten years of age in children born very preterm or with very low birth weight. BMC Pediatr. 2005;5:26-34.
13. Saluja S1, Modi M, Kaur A, Batra A, Soni A, Garg P, et al. Growth of Very Low Birth-Weight Indian Infants During Hospital Stay. Indian Pediatr. 2010;47:851-6.
14. Rathore AS, Aiyer SG, Sethi A. Post natal growth pattern of very low birth weight infants up to corrected 40 weeks of gestational age. IAIM. 2016;3:11-20
15. Lee SM, Kim N, Namgung R, Park M, Park K, Jeon J. Prediction of Postnatal Growth Failure among Very Low Birth Weight Infants. Scientific Report. 2018;8:3729.
16. Fenton TR, Nasser R, Eliasziw M, Kim JH, Bilan D, Sauve R. Validating the weight gain of preterm infants between the reference growth curve of the fetus and the term infant. BMC Pediatrics. 2013;13:92.
17. Mamun MAA, Hoque MM, Chowdhury MA KA, Hossain MM, Shirin M, Ye LL. Study of Premature Infant during Early Period of Life. Northern International Medical College Journal. 2015;7:115-8.
18. Klevebro S, Lundgren P, Hammar U. Cohort study of growth patterns by gestational age in preterm infants developing morbidity. BMJ Open. 2016;6:e012872.

19. Ehrenkranz RA, Younes N, Lemons JA, Fanaroff AA, Donovan EF, Wright LL, et al. Longitudinal growth of hospitalized very low birth weight infants. Pediatrics. 1999;104:280-9.

20. Lemons JA, Bauer CR, Oh W, Korones SB, Papile LA, Stoll BJ, et al. Very low birth weight outcomes of the National Institute of Child health and human development neonatal research network. Pediatrics. 2001;107:E1.

21. Fanaroff AA, Stoll BJ, Wright LL, Carlo WA, Ehrenkranz RA, Stark AR, et al. Trends in neonatal morbidity and mortality for very low birthweight infants. Am J Obstet Gynecol. 2007;196:147.e1-8.

22. Gutbrod T, Wolke D, Soehne B, Ohrt B, Riegel K. Effects of gestation and birth weight on the growth and development of very low birthweight small for gestational age infants: a matched group comparison. Arch Dis Child Fetal Neonatal Ed. 2000;82:F208-14.

23. Brandt I, Sticker EJ, Lentze MJ. Catch-up growth of head circumference of very low birth weight, small for gestational age preterm infants and mental development to adulthood. J Pediatr. 2004;144:412.

24. De Curtis M, Rigo J. Extrauterine growth restriction in very-low-birthweight infants. Acta Paediatr. 2004;93:1563-8.

25. Wu YJ1, Yu JL, Gu R. Multiple-factor analysis of weight gain in very low birth weight infants. Zhonghua Er Ke Za Zhi. 2005;43:916-9.

26. Were FN, Bwibo NO. Early growth of very low birth weight infants. East Afr Med J. 2006;83:84-9.

27. Loui A, Tsalikaki E, Maier K, Walch E, Kamarianakis Y, Obladen M. Growth in high risk infants <1500 g birthweight during the first 5 weeks. Early Hum Dev. 2008;84:645-50.

PROFORMA

S.No.

Name:

Father's name: MRD No:

DOB:

DOA: DOD:

Duration of hospital stay:

Gender: Male/Female

Gestation (weeks):

GROWTH STATUS: SGA/AGA/LGA

Address:

Mode of Delivary: NVD/FORCEPS/LSCS

Birth weight in Grams:

APGAR Scores (for inborn):

Signature of Candidates

Signature of Supervisor

REASON FOR ADMISSION:

- Prematurity
- Respiratory symptom
- Respiratory failure
- Sepsis evaluation
- Peri natal Asphyxia
- Seizures
- Hypoglycemia
- Hyper Bilirubinemia
- Metabolic evaluation
- Small for gestational Age
- Large for gestational age

NEONATAL MORBIDITIES

- Birth asphyxia requiring bag and mask evaluation
- Need for ventilation
- Duration of ventillatory support
- RDS
- Need for surfactant
- Apnea of pre maturity
- Feed intolerance
- Need for ionotropes
- Need for CPAP :
- NEC
- Need for phototherapy

Signature of Candidates

Signature of Supervisor

- Need for exchange transfusion
- Abnormal ROP Screening
- Sepsis

OTHER INFORMATION

- Birth weight Gestational Wt.

LMP – Gestation NBS – Gestation

Daily weight Gain:

Length:

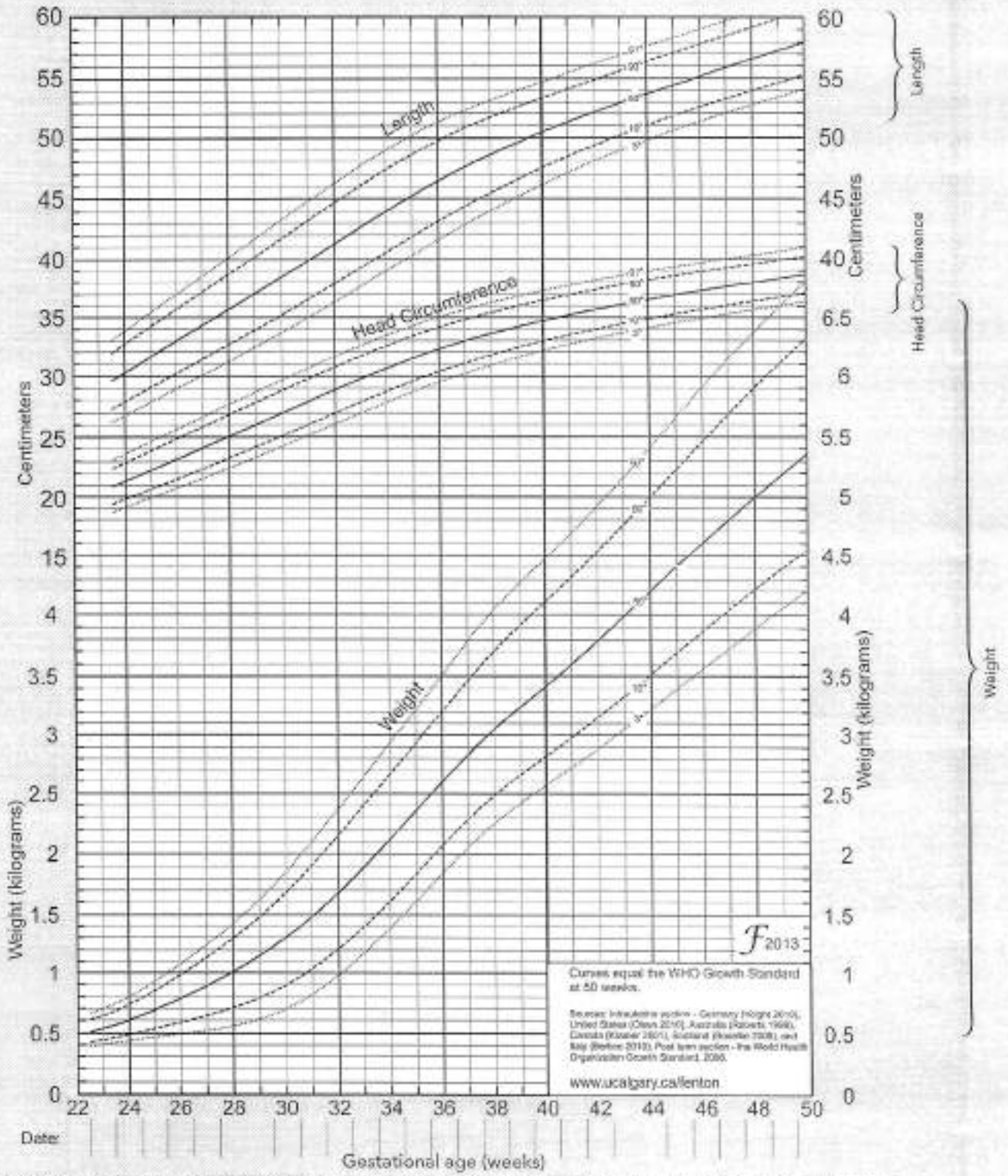
HC:

NICU Stay:

FENTON'S chart to be attached.

Signature of Candidates **Signature of Supervisor**

Fenton Preterm Growth Chart for Girls



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Name _____ Date of Birth _____ Record # _____

Date												
Age in Weeks												
Length												
Head Circumference												
Weight												

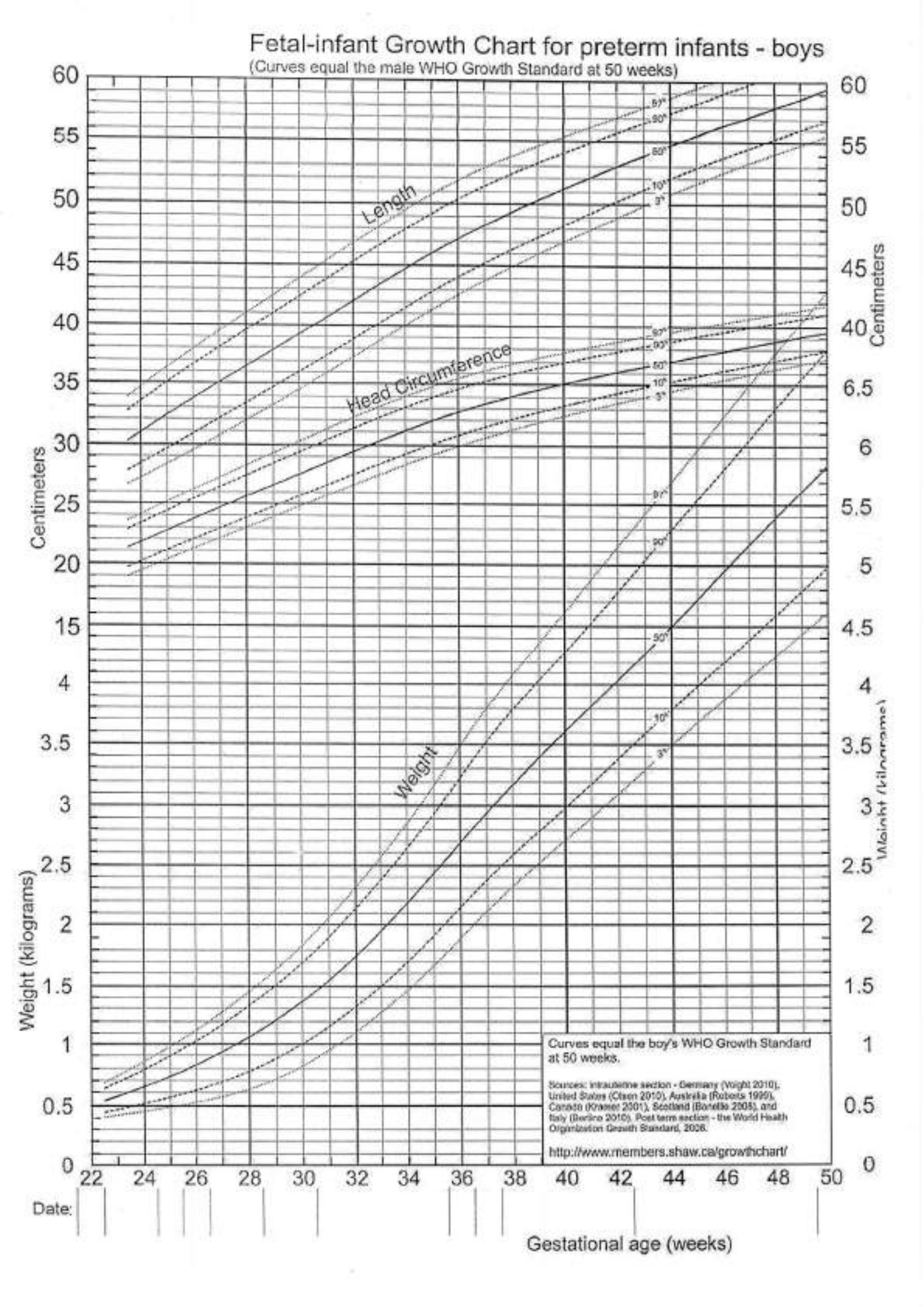
Size for Gestational Age

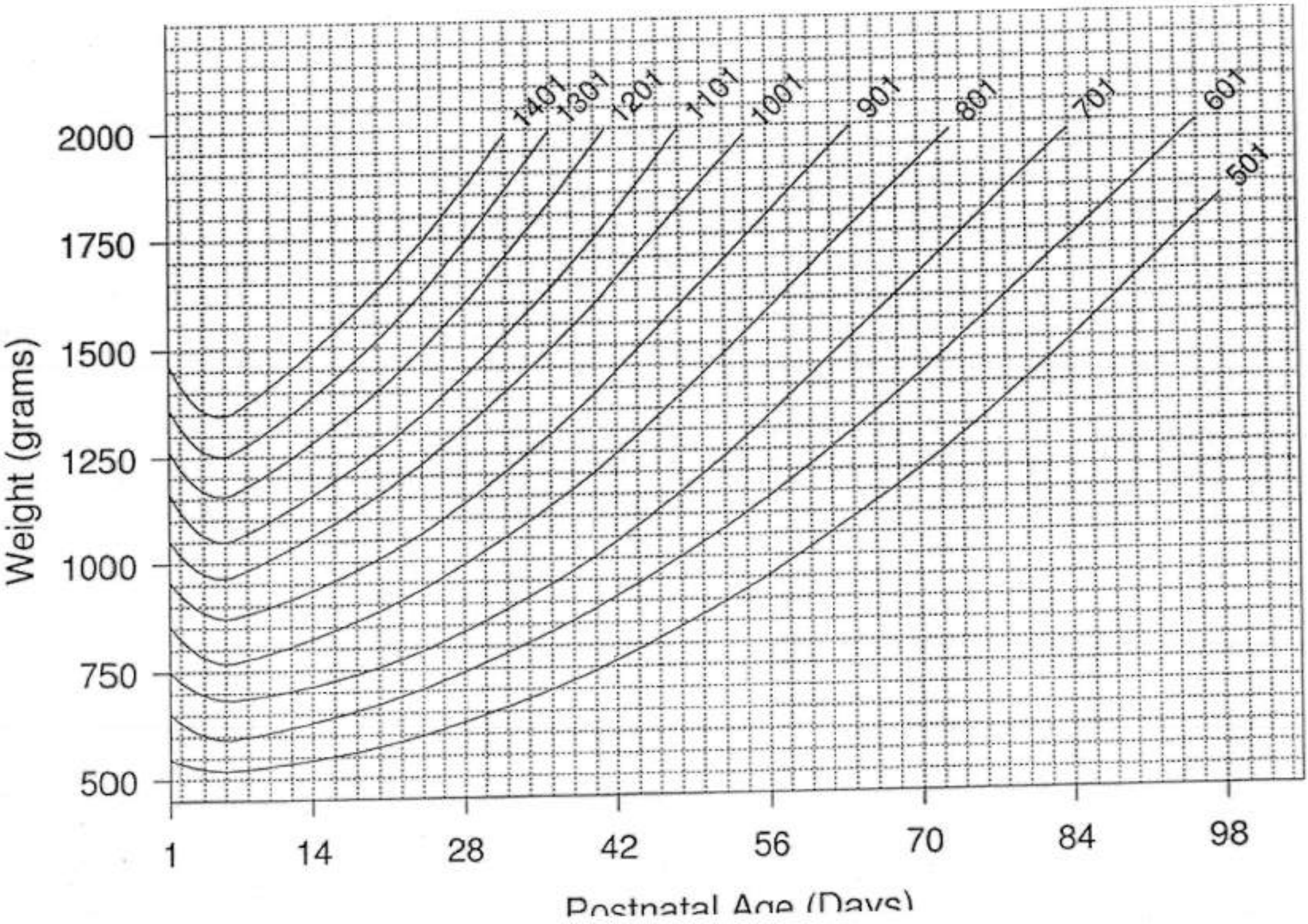
SGA _____

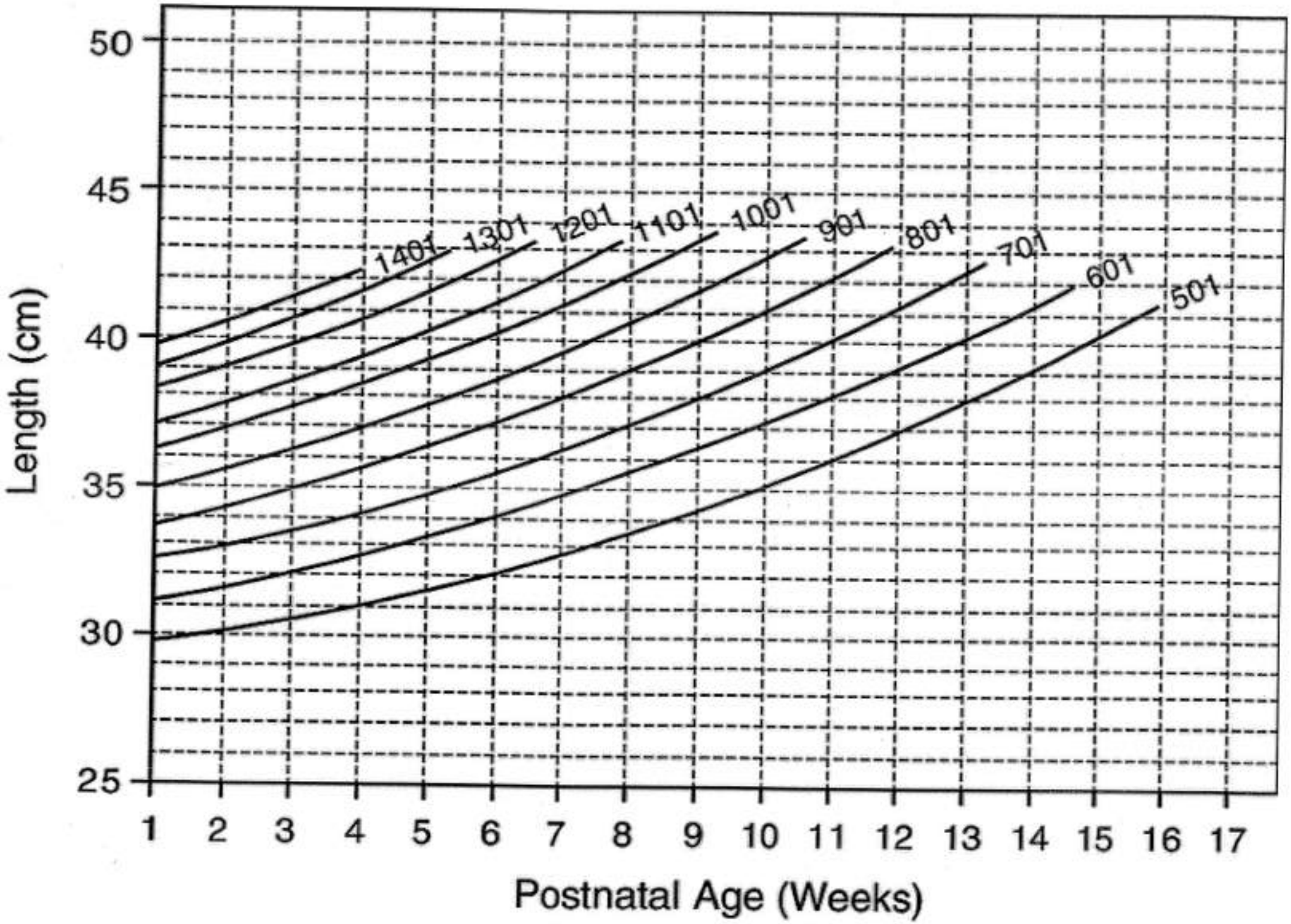
AGA _____

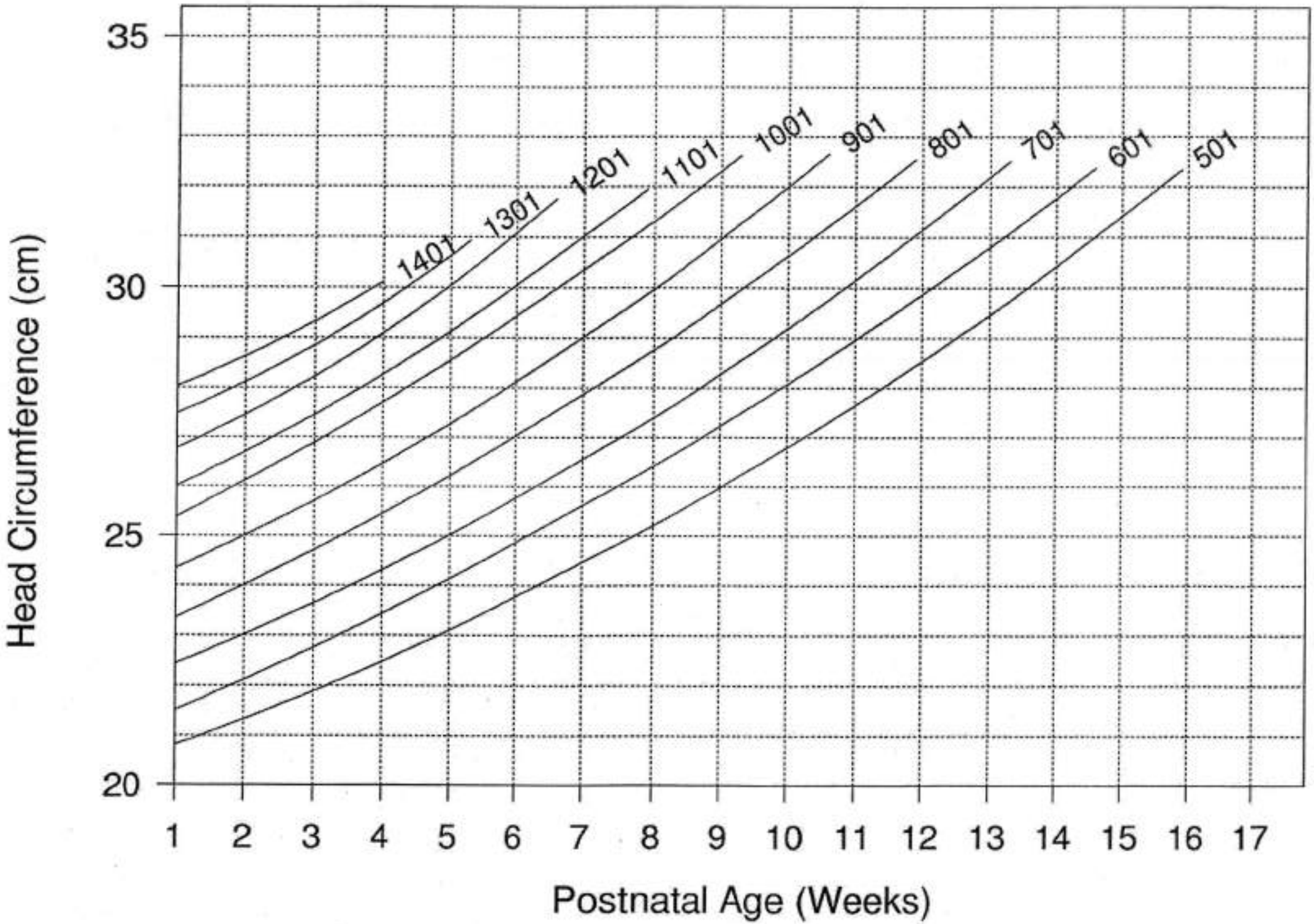
LGA _____

Abbott Nutrition


Fetal-infant Growth Chart for preterm infants - boys
(Curves equal the male WHO Growth Standard at 50 weeks)
Length
Head Circumference
Weight
97°
90°
50°
10°
3°
Centimeters
Weight (kilograms)
Curves equal the boy's WHO Growth Standard at 50 weeks.
Sources: Intrauterine section - Germany (Voigt 2010), United States (Olsen 2010), Australia (Roberts 1999), Canada (Kramer 2001), Scotland (Bonellie 2005), and Italy (Berlino 2010). Post term section - the World Health Organization Growth Standard, 2006.
http://www.members.shaw.ca/growthchart/
Date:
Gestational age (weeks)


1401
1301
1201
1101
1001
901
801
701
601
501
2000
1750
1500
1250
1000
750
500
Weight (grams)
1
14
28
42
56
70
84
98
Postnatal Age (Days)


Length (cm)
50
45
40
35
30
25
1401
1301
1201
1101
1001
901
801
701
601
501
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Postnatal Age (Weeks)


Head Circumference (cm)
35
30
25
20
1401
1301
1201
1101
1001
901
801
701
601
501
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Postnatal Age (Weeks)

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o,

S/o..... .....am willing to participate in the study **"TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Supervisor

Signature of Candidate

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____

गवाह के हस्ताक्षर

नाम:

_____

रोगी के हस्ताक्षर/अंगूठे का निशान

नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"TO STUDY THE GROWTH PATTERN OF VERY LOW BIRTH WEIGHT NEONATES DURING HOSPITAL STAY IN NEONATAL INTENSIVE CARE UNIT" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ